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NEED FOR REORIENTATION IN PERSONNEL POLICY STRESSED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 3, Mar 87 (signed to press 2 Feb 87) pp 1-3

[Article by Col Gen Avn L. Batekhin, member of military council, chief of political directorate of Air Forces: "Improve Personnel Work"]

[Text] Personnel policy is a very powerful factor in party leadership of a socialist society. "The success of reorientation depends to a decisive extent on how quickly and thoroughly our personnel will perceive the need for changes and how imaginatively and purposefully they will implement the party line," emphasized CPSU Central Committee General Secretary Comrade M. S. Gorbachev in a report at the January 1987 party Central Committee Plenum. "Today we need a personnel policy responding to the tasks of reorientation and to the need for accelerating social and economic development. In formulating its underlying requirements we must take account both of past lessons and of those new scaled tasks which life has posed today."

The command authority, political bodies and party organizations of the Air Forces are striving to creatively implement the party Central Committee's key lines and the demands of the USSR Minister of Defense and chief of the Main Political Directorate of the Soviet Army and Navy on elevating the political activeness, initiative, responsibility, competence and businesslike efficiency of management personnel. It is natural that reorientation is needed above all in personnel work itself under conditions of profound universal changes. A great deal of formalism, stagnation and stereotype also has built up here. Therefore one of the priority tasks stemming from resolutions of the January 1987 CPSU Central Committee Plenum is to eliminate the consequences of distortions and mistakes which have been made as quickly as possible and see to it that the businesslike mood and life pulse of command-political and engineering-technical personnel and equally the entire system of work with them completely conform to the dynamism of the present stage in the Air Forces' development.

A certain amount of work in this direction has been done in the Air Forces in the period which passed since the April 1985 CPSU Central Committee Plenum and the 27th party congress. A trend toward overcoming the gap between word and deed in personnel policy has appeared and is being developed as a result. The party line toward an optimal combination of experienced personnel with young ones who have an inherent desire for innovation, creative exploration and bold

decisions has begun to be implemented with greater principle and determination. There are certain improvements for the better in the selection and placement of candidates for advancement with consideration of the priority of political, job and moral qualities and the end results of their activity. A firm course has been set toward stabilizing management personnel, especially commanders, political personnel and chiefs of staff of units [chast and soyedineniye]. There has been reinforced supervision by commanders, political bodies and party organizations over the appointment of graduates of Air Forces educational institutions to positions, over the transfer of personnel being replaced, over the extension of periods of active military duty and so on. The past performance appraisal of officer personnel was an important political measure designed to objectively and comprehensively evaluate personal qualities and the official and social activities of personnel and promote an acceleration in the reorientation of work with them.

In critically assessing what has been done from the standpoint of demands of the January 1987 CPSU Central Committee Plenum, however, it must be said frankly that there still are substantial omissions in personnel work and in the activity of political bodies and party organizations to improve it. These omissions retard development of positive processes in the Air Forces; degrade the role and influence of the human factor on a reorientation of operational-training, indoctrinational and other spheres of military activities; and as a result have a negative effect on end results of combat and political training and on the status of discipline and order.

A number of air subunits received low marks in final and other inspections in the past training year. It is also of serious concern that the growth in basic quality indicators of aviators' military labor is impermissibly slow in some military collectives, including those which have mastered or are mastering new aviation equipment. Some commanders, staffs, political bodies, and party organizations of the North Caucasus, Carpathian and Kiev military district air forces are marking time in resolving problems of improving flight safety. Requirements of the CPSU Central Committee, USSR minister of defense and CIC of the Air Forces for strengthening military discipline, efficiency and order are being implemented without proper responsibility or persistence by party members/leaders A. Tarakanov, V. Polyakov, V. Kozlov, F. Zhivoglazov, Ye. Zarudnev, B. Rozhkov, L. Agurin and G. Galyashkin.

An analysis of inspection materials and a study of the state of affairs locally show that many miscalculations could have been avoided had the command authority, political bodies and party organizations--beginning with the central Air Forces staff and ending with the squadron and company--always consistently implemented a fundamental, effective personnel policy, thus assuring high efficiency of all elements of combat control and party leadership.

Proper conclusions must be drawn from past mistakes and from lessons mentioned at the January CPSU Central Committee Plenum. One is that we must not allow an underestimation of political and theoretical training as well as ideological-moral conditioning of personnel. This results in serious interruptions in the work of military collectives, aircraft repair enterprises, higher educational institutions and establishments.

Substantial shortcomings in the training and indoctrination process were identified during an inspection in the unit where officers V. Selivanov and V. Konev serve. End results of the aviators' military work were below their capabilities. It was learned that this was not a chance failure. Reorientation had been accomplished in the collective only in words. Supervision over the quality training of flight personnel and the servicing of aviation equipment and armament had relaxed. No party influence was felt in decisive sectors of the campaign for high combat readiness, military proficiency and flight safety. I had occasion to be at a report-election meeting of the headquarters party organization where the above party members are on the rolls and to hear these and many other critical comments addressed to them. It must be said that the party buro also was not up to the task: party members deemed its work unsatisfactory. It would appear that this is the natural outcome for those who live in yesterday.

Today the deciding criterion in evaluating personnel is their attitude toward reorientation and their actual work. Of course we cannot help but take into account that stagnation and other negative consequences of the mistakes which have been made will not be eliminated nor will changes be achieved at a single stroke. There must be painstaking, persistent work aimed at improving all work with officer personnel and at instilling in them high party qualities, an acute sense of new things and a long-term view. It is important to remember here that work with personnel is the duty not only of personnel organs, but above all of political organs and party organizations.

Special importance is assumed by the responsibility, independence and initiative of leaders at the present stage of Air Forces' reoutfitting and under conditions of an intensification of combat training and the concomitant abrupt change in people's psychology and in stabilized views on operational art, tactics, and criteria of air and weapon training, and in connection with the fundamental reorientation of organizational and political indoctrination work. Managers simply are obligated to boldly take up any of the most difficult tasks and persistently accomplish them while overcoming stagnation and routine.

These qualities most often are inherent in people free of the psychological burden of past mistakes, who are faultless in the present, who know the price of trust and who are incapable of bargaining with their conscience. There are many such officers in the Air Forces. A wide road must be opened for them and conditions must be created for revealing the full extent of their organizational, professional and creative abilities.

It must not be forgotten, however, that self-seeking, time-serving, and moral unscrupulousness often hide beneath the mask of demonstrative activeness, businesslike efficiency and principle.

At one time Officer V. Nazarov was advanced to a responsible position. Lack of supervision and an incorrect understanding of the great rights granted by military regulations aggravated his negative character traits. Nazarov suffered deserved punishment for drunkenness, illegal expenditure of supplies and other infractions.

An increase in objectivity in evaluating officer cadres is a reliable way to prevent mistakes in personnel selection and one of the most important conditions for reorienting personnel work. Objectivity of advancement, reward, and promotion above all is an indicator of the party maturity of managers whose duties include resolving personnel matters. In practice, however, the political, job and moral qualities of aviators sometimes are studied superficially or are not taken into account and the opinion of the collective, political body, or party organization is not considered.

Officer A. Shevelev, who had received punishments for lack of discipline and who had been brought before a comrades' court of honor of junior officers, was appointed unit food service chief a little over a year ago. In this time he was given disciplinary and party punishment seven times and was given a performance appraisal as not conforming to his position, but the officer was promoted to the next rank by decision of the higher command authority. The political officer and party organization were confronted with a fait accompli. The question of Officer Yu. Gneushev's transfer to a preferential area with an advancement in position was decided in exactly the same way, bypassing the opinion of immediate superiors and the party organization.

We also run across instances where only an education diploma is taken into account in advancing and moving command-political and engineering-technical personnel, while officers' organizing abilities, their ability to work with people and their abilitiy to evaluate the political consequences of their decisions are not considered at all. There are instances of a very gross violation of Leninist principles of personnel selection, placement and indoctrination and of the norms of party life, where officers are appointed to positions, recommended for awards and honorary titles, and allocated after completing higher educational institutions not on merits and personal qualities, but based on the protection of managers and on ties of friendship and relationship. All this is a detriment to personnel indoctrination, undermines the authority of and trust in commanders, political bodies, staffs and party organizations, and leads to perceptible outlays in aviators' combat training.

The January 1987 CPSU Central Committee Plenum resolutely demanded an elimination of phenomena alien to Leninist principles of party management. A need to advance political maturity, activeness, professional and organizational qualities, and moral purity to the fore in evaluating officer cadres is seen in the practical implementation of plenum resolutions as applied to the tasks of reorienting personnel work in the Air Forces. It is no less important to consider boldness and innovation in thinking and actions, the desire and ability to work under conditions of reorientation, and nearness to people. The real results achieved by an officer and his subordinates in combat and political training as well as the capability of a candidate for advancement to work in a higher position and achieve success unquestionably must be the determining argument in deciding personnel questions.

It should be noted that of late many air commanders and chiefs have begun to pay more heed to the opinion of military collectives and party organizations concerning candidates for advancement and transfer. This is confirmed, for

example, by the experience of the Military Transport Aviation command authority and political department. In deciding personnel issues here they direct attention to the objectivity of the latest performance appraisals, recommendations, and official and party records of officers. If it is discovered that a person has been given inflated marks, appropriate commanders and political officers are given a hearing in the political department and at sessions of party committees and buros of primary party organizations of units and subunits. Guilty parties are held liable for disciplinary and party punishment. Wide publicity also permits each such instance to be made a lesson for all party members/leaders of air units and subunits. This positive experience must be disseminated.

Lenin taught that a workers' and peasants' state "must widely, systematically and openly pose the matter of selecting the best personnel in administrative organizational development and the best administrators and organizers on a special and general scale and on a local and statewide scale." The January 1987 CPSU Central Committee Plenum also specified a specific direction for accomplishing this task under present-day conditions by obligating all party organizations to take an active part in conducting personnel policy.

Experience indicates that party members in those party collectives where an atmosphere of mutual exactingness, respect, honesty and principle reigns approach the evaluation of political, job and moral qualities of commanders and colleagues with every sense of responsibility and defend truth with might and main. But this is far from how matters stand everywhere. Slow reorientation of party work affects everything, including a delay on changes for the better in personnel activities. Formalism, lack of principle, and the habit of some party members of falling in line with the opinion of superiors even today engenders personnel mistakes and very gross violations of party norms and principles.

The fact of persecution of Party Member Yu. Danigevich, a squadron navigator from the training regiment of the Borisoglebsk Higher Military Aviation School for Pilots imeni V. P. Chkalov, for criticizing shortcomings in the training and indoctrination process was widely publicized. Instead of looking into the conflict quietly and in a businesslike manner, the unit political department and party committee themselves succumbed to arrogant sentiments. The higher command authority and political bodies were forced to take up this unusual incident for several months. As a result Officer Danigevich has been restored in the party and in his military rank. Over ten party member managers of the regiment, school, political department and staff of the Moscow Military District Air Force were given disciplinary and party punishment.

Unfortunately not everyone benefited from the lesson. There was an attempt in one of the aviation collectives of Central Asian Military District to exert pressure on a party organization with the objective of gaining the expulsion of Officer V. Razin from CPSU candidate membership. Razin had criticized deficiencies in the personal conduct of his superior, Officer I. Filipenya, at a party meeting. The district political directorate called the suppressors of criticism to order, but even this did not stop them. The intervention of the higher political body again was required.

To avoid a repetition of such instances it is necessary to affirm principles of one-man command on a party basis and create an atmosphere of genuine collectivism and comradeship in units, subunits and party organizations more persistently and consistently. Party committees and party buros must show more objectivity and responsibility in evaluating the merits and deficiencies of party members who are candidates for advancement and must make fuller use of their rights. No one is permitted to forget that no matter what post a manager holds, this does not elevate him above the people, but merely obligates him to greater responsibility for fulfillment of official and party duty and for an officer's pure, honest make-up. Without belittling the importance of aviators' volitional qualities and of volitional principles in management and command and control, our command-political and engineering-technical personnel must learn to work under conditions of deepening democracy and growing political and labor activeness of Air Forces personnel.

Meanwhile we are obligated to see and understand problems of reorienting the work with officer personnel enormously more widely and on a larger scale. It is a question of the revival, at all levels of administrative and party leadership, of an attitude toward personnel work as a political activity; it is a question of a persistent search and active implementation of those forms and methods of party influence over personnel policy in the Air Forces which will permit making it a genuinely effective instrument for accelerating positive processes and changes in all spheres of operational training, indoctrination, and administrative activities. Ways of accomplishing this priority task were concretized in the decree of the January 1987 CPSU Central Committee Plenum. They include a strengthening of Marxist-Leninist theoretical training and of ideological-moral conditioning of personnel and their development of a high political and moral culture. It is important to have every officer and party member thoroughly understand the essence of the party's course toward acceleration and to have an ability to closely tie in program objectives in the assigned work sector with daily organizational and indoctrinational activities.

I would like to say just a brief word about creating a full-fledged pool of management personnel in every unit large and small [chast and soyedineniye]. The fact is that an underestimation of this affected (and even now still perceptibly affects) the quality with which missions facing the Air Forces are accomplished. We have many examples where officers are advanced and reassigned without trained people being appointed to the vacant positions, leading to a "denudation" of the most important military collective management sectors for a lengthy period. We have not overcome stagnation in the advancement of young promising officers or sluggishness in relieving managers who have made a mess of things. There are other manifestations of personnel reshuffling as well.

Today's high demands on management personnel elevate the importance of a precise, well-conceived system for forming their replacements. The first steps toward creating such a system have been taken in the Air Forces which in the very near future will allow having a minimum of two or three candidates for leadership positions in units [chast and soyedineniye]. But it is not just a question of numbers. It is important how an officer will be prepared

in the political, professional and other areas so that he can conduct business boldly and confidently when he is in a more independent and responsible job. Experience has shown that the method of "superior teaches subordinate," on-the-job training, and training and methods courses with the pool of candidates for advancement already are insufficiently effective according to today's yardsticks. We need new approaches in managing officer development in a higher position, and we need bold, nonstandard solutions. It is the duty of every commander, political officer, party organization and personnel organ to search for and adopt them.

Concern for and trust in personnel unquestionably must be combined with increased exactingness and supervision over their work; otherwise people's healthy confidence in their abilities and knowledge and their desire to display their best side in a position may develop into a swaggering self-confidence and self-seeking. Wide publicity, criticism and self-criticism, and the supervision and check of execution represent a tested tool for bringing up personnel in a spirit of high party responsibility. "Every manager must be responsible to the full extent for the assigned job, properly build relations with people and inspire them by personal example," states the new wording of the CPSU Program. "Not one party organization and not one person must be left unsupervised."

Proper selection, an effective system for training and indoctrinating management personnel and the pool of candidates for advancement, and effective supervision of their work are impossible without complete and necessarily prompt information in staffs and political bodies on the political, job and moral qualities of officers and on results achieved by them and by their subordinate units and subunits in combat improvement. It would appear that such information must be in the nature of a forecast which would permit more effectively judging the prospects for each officer's official growth. Studies by psychologists and sociologists and the experience of a number of industrial enterprises in the country as well as our own experience persuade us that personnel work needs the unification of expert methods and of conventional personnel accounting data joined in a single orderly system. Time also dictates that the collection, processing and statistical analysis of all this data must be done using computers. This will simultaneously promote an improvement in computer training of command and political personnel and their mastery of modern planning and management methods.

Other organizational and technical issues will arise and require an answer directly in the course of reorienting the work with officer personnel. It is important--and I wish to stress this once more--not to lose sight of the important factor behind them: the attitude toward personnel work as a political activity. One should proceed from the fact that the CPSU always has considered and does consider military personnel as a very important and inalienable part of party and state personnel. The January 1987 party Central Committee Plenum decree notes: "The CPSU Central Committee highly esteems the work of military cadres and of Soviet Army and Navy personnel reliably defending the people's peaceful labor and the Motherland's security and performing international duty with honor. We must continue to elevate the responsibility of commanders, political personnel, all officers, and party organizations of the Army and Navy for keeping the military discipline, the

ideological and moral indoctrination of servicemen, and their combat and political training at a high level, and we must continue to be constantly concerned for the everyday conditions of servicemen and their families."

The high trust and constant concern of the party and people for the Air Forces obligate every officer and every airman to make a worthy contribution to fulfilling resolutions of the 27th party congress and the January 1987 CPSU Central Committee Plenum by his selfless labor and to be in the vanguard of the campaign for accelerating and deepening the process of reorientation and elevation of the Air Forces to a qualitatively new level in their development.

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INCREASED DEMANDS ON NAVIGATOR DETAILED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 3, Mar 87 (signed to press 2 Feb 87) pp 5-6

[Article by Lt Col P. Makshakov, 1st Class military navigator, under rubric "Navigator Training": "The Navigator is Not Just a Navigator..."]

[Text] It is common knowledge that new aviation equipment always demands a certain reorientation by flight personnel of some of the methods of preparing for and executing flights. The fact is that forms of flight support also are subject to fundamental changes with the introduction of modern equipment. For example, there was the appearance of the previously unknown flight software, mathematization of the process of preparing flight personnel and aviation equipment for a flight, and so on. Today qualitatively new means are being added to the traditional means of air navigation and combat application, and functions of in-flight data processing have been assumed by computers. The role of the crew of a modern aircraft under existing conditions reduces to a considerable extent to monitoring the working capacity of computers in flight and rapidly evaluating factors influencing mission accomplishment. Experience convinces us that if the BTsVS [not further identified; probably flight computer] fails, flight personnel must be ready at any moment to take on the functions of controlling the aircraft and finishing the job.

The crew navigator chiefly is the one to resolve these matters since he is immediately responsible for the quality of navigation and combat application. The majority of our unit's navigation service specialists successfully master the sophisticated aviation system and constantly improve professional expertise. Subunit navigators officers N. Rodygin, V. Goncharov and others enjoy deserved authority among personnel. They were among the first to master basic kinds of combat application and armament of the aircraft. They draw subordinates after themselves by personal example by making each flight with a high grade. It is no accident that last year the subunits in which they serve achieved good results in navigation and bombing training.

Why did the demand on the navigator's initiative in the process of resolving combat training problems increase so much? In order to answer this question with sufficient completeness, let us consider the basic range of problems which arise for today's navigator and how his personal initiative can influence the performance of an exercise.

Assurance of the precision of air navigation is one of the tasks which he encounters before and during the flight. He has at many means of correction

and sighting systems his disposal which can be used to determine the aircraft's location. Among such means the specialist can choose a visual correction using aiming and flying sights and television systems; radiotechnical correction using the flight radar and radiotechnical systems for long-range and short-range navigation; astronomical correction and others. Each kind of correction has modifications which determine accuracy under specific flight conditions. In addition, the role of the inertial-doppler method of computing coordinates which permits navigating for a lengthy time with necessary accuracy without any correction at all has grown incommensurably at the present time. It would seem that one only has to scrupulously fulfill requirements of the documents for operating air navigation and combat application systems and success will be assured, but experience convinces us that mechanical execution alone is not enough; there must be an imaginative approach to matters. This is why our unit accumulates and processes statistical material on the accuracy of route flights of a specific aircraft and determines the accuracy of its autonomous navigation and performance of a correction with the help of various systems.

This of course requires additional time inputs, but they are repaid a hundredfold.

For example, a navigator who constantly monitors the operation of his aircraft's aiming-navigation system already can conclude before the flight based on assignment conditions that, for example, in adjusting the inertial navigation system by the dual gyrocompassing method his system will provide for the target approach with an accuracy necessary for target detection even without an en route flight correction. Nevertheless, the main result of this work is something else. Constant monitoring of the working capacity of their aircraft's PNK [aiming-navigation system] allows navigators to promptly conclude any changes in its operation and to prevent possible in-flight failure or identify the incipient degradation of the working capacity of particular sensors.

Or take for example the methodology the unit has for evaluating the accuracy of setting the small gyro-inertial system before a flight. According to existing documents, this is to be done before the aircraft taxies out using the method of comparing bearings of various subsystems according to directions of the NPP [Manual for Flight Procedures] for the pilot and navigator. On the other hand, however, if setting accuracy is determined in angular minutes, can it be evaluated from indicators with a reading accuracy of 1-2°?

To avoid mistakes regimental navigation service specialists performed studies which resulted in finding methods of evaluating the working capacity of the aircraft course systems after taxiing with an accuracy to angular minutes and determining how to take account of "drifts" of deadreckoning to a particular side by a certain amount from the moment of take-off; this substantially facilitated navigation support of a flight. In addition, flight personnel had an opportunity to make effective use of gyro-inertial systems with necessary accuracy at airfields not topogeodetically prepared.

The constant focus of the navigation service's attention also includes questions of using the radiotechnical long-range navigation system. At one

time necessary calculations were performed for using this system which made it considerably simpler to obtain requisite data for flights from any airfields. Nevertheless, in accomplishing this task we were unable to untie the entire knot of problems which to the present time do not permit realizing all the capabilities of aviation equipment. The fact is that the microcalculators we have are morally and technically obsolete. Because of their primitive nature they do not allow necessary calculations to be performed rapidly.

For example, a determination of data for calculating corrections to radio wave propagation velocity for one point takes much time on a nonprogrammable microcalculator, and calculation accuracy does not hold up to any criticism. Programmable microcalculators are needed which allow solving a large range of applied aviation problems. Take for example preparation for combat application on unfamiliar ranges. In calculating flight programs the need arises to check the conformity of rectangular and geodetic coordinates of targets given in the instructions for use of a given range. A check is needed to reveal errors in the coordinates of objects. This can be done by the graph construction method and by means of an analytical recalculation of coordinates from one system to another. Precise recalculation functions are rather cumbersome and lose in promptness because of this. Our unit's navigator-programmers used a relatively simple method of performing recalculations which permits checking the accuracy of reduced coordinates of 15-20 targets in a period of 20-30 minutes. It consists of selecting the mean radii of a terrestrial ellipsoid on the relatively small sector of the Earth's surface limited to the range's work field, where there are scales of the conformity of geodetic coordinates to Gaussian coordinates. The necessary recalculation was performed on it.

Computers at the disposal of engineering and technical personnel, for example, can be of substantial help in mathematizing the entire process of preparing navigators and the navigation system for a flight. It became advisable long ago to organize regular courses for head navigators to study algorithmic languages of modern computers and the procedure for writing programs for different types of computers. It would appear that such measures will substantially facilitate mastery and use of computer equipment existing in units for statistical processing of various data and for performing operational calculations.

A knowledge of the modern navigation system's capabilities unquestionably also carries over to flights. Comprehensive use of all means of navigation essentially precludes the possibility of losing one's bearings or of great deviations from the course line, and every navigator must clearly realize that any deviation from this condition inevitably will lead to error.

Experience shows that deviations immediately arise as soon as complacency and confidence in one's infallibility set in. For example, the crew in which Capt Sh. Sharofeyev is the navigator is regarded as one of the best in the regiment, but at some stage the aviators relaxed in exactingness toward their training, which was revealed in a tactical flying exercise. In flight the crew failed to monitor the target approach time; their strike was almost a minute late and they extended the calculated strike time for the crews following them.

This incident vividly demonstrated to all regimental flight personnel that there are no trivial matters in aviation and that one must prepare as thoroughly for every assignment as for an exam.

Let us consider some points of the navigators' mastery of the aviation system in flight. The absolute majority of officers successfully mastered basic kinds of aircraft armament, sighting equipment and methods of attacking ground targets, but some crews with approximately the identical level of training nevertheless differ from each other in fulfilling combat application. It is apparently a matter of a different approach to their professional training in general and to performance of a specific assignment in particular. Our foremost aviators captains V. Skakovskiy, A. Mokin and others constantly display an intelligent initiative based on a firm knowledge of the equipment being operated, permitting them to accomplish the most difficult missions. These officers proved themselves to be experienced masters in a past LTU [tactical flying exercise]; they were able to locate targets and hit them in a sniperlike manner under difficult conditions. The aviators repeatedly have demonstrated an ability for comprehensively employing all air navigation, search and aiming equipment.

The experience of socialist competition leaders persuades us that it is initiative and imagination that predetermine success in flying. That means these qualities must be developed in every way.

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COMPETITION OF HELICOPTER GUNSHIP CREWS DESCRIBED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 3, Mar 87 (signed to press 2 Feb 87) pp 8-9

[Article by Maj N. Tsvetov, 1st Class military pilot, under rubric "Socialist Competition: Factor of Acceleration": "By Tasks and Norms"]

[Text] Year in and year out aviators of the outstanding squadron commanded by Maj L. Skubenko demonstrate high, stable results in combat training and socialist competition. They average 4.7 points here in combat application. All helicopter commanders have a 1st Class rating. Over 70 percent of the aviation engineering service specialists are masters of combat qualification or 1st or 2d class technicians and mechanics. Many have mastered related specialties. Subunit aviators successfully passed the final inspection for the past training year and completely fulfilled their pledges. A persistent struggle is under way here in the winter training period for further increasing combat readiness, military proficiency and flight safety and for strengthening disicpline and efficiency.

This collective's achievements are the result of extensive painstaking work by commanders, chiefs and the party and Komsomol organizations. The training process is well adjusted in the squadron, purposeful party-political work is carried out, and Leninist principles of socialist competition are widely applied in practice; such competition unfolded with new force during practical work to fulfill pledges made in honor of the 70th anniversary of the Great October. Competition has a beneficial effect on all aspects of the aviators' life and operational training activities and makes for a lively, creative atmosphere in classes and flights.

An acute rivalry for high quality in tasks and norms to be fulfilled developed back on the ground among the flights, which were long-time rivals in competition, as well as among crews in the flights during equipment and armament preparation for the sortie. The competition carried over into the air. The end result of collective labor depended largely on the helicopter commanders and pilot-navigators. The helicopter personnel had to perform range firing, land motorized riflemen on unfamiliar zones, and move combat equipment by air. They worked everywhere with initiative and to their utmost. Each person tried to accomplish the assigned mission with quality and to demonstrate his proficiency to the full extent.

The squadron commander, his political deputy Maj V. Shaprynskiy, subunit party organization secretary Sr Lt O. Mikhalev and other party and Komsomol activists did a great deal to keep up the personnel's high combat mood and create an atmosphere of comradely rivalry. On the eve of the tactical flying exercise they helped the aviators plan individual socialist pledges in such a way that the pledges were within their ability and at the same time forced them to work to their utmost. Some had to be warned against overestimating their abilities, and others against excessive caution.

For example, Sr Lt S. Ustinov, a pilot from Maj N. Gerasimov's flight, pledged to hit ground targets in the LTU [tactical flying exercise] only with a grade of "good," although prior to this he had performed all flights to the range with the highest grade, had won the right to be called a master of combat application and was regarded as the best squadron gunner. At a party meeting held during exercise preparation party members criticized Ustinov and some other pilots and technicians who were underestimating the importance of competitiveness. The aviators adjusted their pledges.

Members of the subunit wall newspaper editorial board headed by Sr Lt V. Tyukhtin also worked rather well. Permeated with the spirit of struggle to fulfill the pledges made and with faith in success, a special issue of the wall newspaper called on helicopter personnel to accomplish tactical flying exercise missions honorably and indicated where foremost experience was to be found. Activists at the starting line and in the squadron area promptly made up "competition boards." Every aviator knew the pledges of his comrade and rival by looking at the chart and could compare that person's indicators and his own during the exercise.

An exchange of experience in accomplishing the most difficult tactical and fire missions was arranged at the initiative of the party buro during which Maj N. Gerasimov, known for his ability to hit targets on the first pass, directed colleagues' attention to the need for accurate maintenance of flight parameters, precise actions on the firing course and careful aiming. In talking with young aviators, Capt A. Nikulin emphasized that it was impossible to penetrate "enemy" air defense zones successfully without an excellent knowledge of the tactical situation and a study of the disposition of the opposing side's forces and weapons.

Unremitting attention was given to propaganda of foremost experience during the exercise. In maintaining the fire of competition, agitators and non-TO&E propagandists, with the help of the commander and political officer, promptly informed personnel of results of the last sorties and achievements of outstanding aviators.

Competition unfolded among crews and crew members in Maj Tolmachev's flight, which took off for the range to see who would be first to detect the camouflaged "enemy" target and notify the commander of this. Flight technician Sr Lt A. Galkin of the leader's crew proved to be the most sharp-sighted and attentive. On hearing his report, Maj Tolmachev quickly got his bearings in the situation and delivered an accurate missile strike against the target from the move. The wingmen attacked the target after him.

Prompt summarization of results of the competition in tasks and norms in the flight, in maintenance groups and in the squadron greatly contributed to strengthening the spirit of competitiveness and healthy rivalry. Commanders attempted to objectively evaluate the actions of each crew, pilot, technician and mechanic and to uncover reserves.

The results of firing against ground targets proved to be a bit higher for aviators of Maj Gerasimov's flight in the first phase of the tactical flying exercise than for their rivals in competition. After carefully analyzing conditions and features of the helicopter personnel's combat work, however, squadron commander Maj L. Skubenko named Maj Tolmachev's subordinates as best. The fact was that in penetrating the "enemy" air defense zone his flight had employed a maneuver that was nonstereotyped and the most effective in the given situation, which hindered the "enemy" in detecting the rotary-wing craft. It is true that this complicated the crews' field of view and visual target search, but here the aviators were helped out by their proficiency and thorough preparation for the sortie. The assigned mission was accomplished, and in the umpires' opinion it was done so without "losses". Maj Gerasimov's flight on the other hand proceeded at an altitude greater than its competition rivals for a better view of the terrain. In an actual combat situation this would make it easier for the enemy to conduct aimed fire against the helicopters.

The aviators of Gerasimov's flight did not plan to concede first place without a fight. In the very next sortie they showed better results in landing a tactical assault force in the depth of the "enemy" defense: they landed the motorized riflemen from a hover mode, while the crews of Tolmachev's flight made a landing and spent more time accomplishing this mission.

The experience of the past tactical flying exercise reaffirmed that only a creative approach to organizing competition, as required by resolutions of the 27th party congress and subsequent CPSU Central Committee plenums, permits kindling and maintaining a vivifying flame of competition. Specific objectives, goals and broad opportunities to actually test one's abilities and knowledge in competition with comrades in arms are better than any words for mobilizing aviators to attain high end results in military labor.

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STRENGTHENED RESOLVE NEEDED TO COUNTER IMPERIALIST THREAT

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 3, Mar 87 (signed to press 2 Feb 87) pp 10-11

[Article by Col I. Filatov, Honored Worker of Culture of the RSFSR, under rubric: "At Fronts of Ideological Struggle": "Problems of War and Peace"]

[Text] Ideological opposition has encompassed all aspects of the problem of war and peace. In an attempt to somehow substantiate their aggressive policy, U.S. ruling circles are whipping up anticommunist hysteria and trying in every way to discredit the Marxist-Leninist teaching on war, to depict the foreign policy of the Soviet land in a distorted form, and to evoke a feeling of hatred for Soviet citizens in the West.

Imperialist militarism serves as the military-political expression of militant anticommunism, and various ideological concepts of war are elaborated for its justification. What is new in anticommunism is that today it no longer simply is for "throwing back communism," as in the time of the "cold war," but for totally eradicating it and for restoring imperialism's global domination. This is none other than the inertia of political thinking, hegemonic traditions, and claims to Messianism, to leadership of the whole world. This is the pressure of anticommunist stereotypes.

Day in and day out western mass media preach that force, and chiefly military force, determines the course of world events and will continue to do so. Much is written in the West about sources of violence and wars, and history is depicted as a disorderly accumulation of conflicts.

Some bourgeois ideologs deliberately absolutize the role of violence in the historical process and mechanically transfer military experience of the past to modern times. Numerous concepts (sociological, biological, psychological, technocratic and so on) in which war is justified and its genuine social-economic and class-political sources and causes are concealed are implanted in the popular masses. Adherents of such concepts interpret war either as an ineradicable biological phenomenon concealed in the genes and in people's blood or as a psychological phenomenon engendered by the aggressive nature of man, who allegedly is inclined to violence.

For example, West German professor (H. Kuhn) declares that man is dangerous to himself and those like him. Former Assistant to the President for National

Security Affairs Z. Brzezinski asserts that the deepest meaning of the conflict with the Soviet Union lies in qualitatively different human acts. Bourgeois politologists shield imperialism, which is the source of wars, by placing full responsibility for the appearance of conflicts on man in an abstract sense.

V. I. Lenin emphasized that wars "always are begun everywhere by the exploiting, ruling and oppressing classes themselves." It is they, in his words, who usually are first to resort to violence and war and "make the bayonet the order of the day." A resolution of the 27th CPSU Congress on the party Central Committee Political Report confirms this idea of Lenin's: "Responsibility for wars and conflicts of our era, for unleashing and continuously whipping up the arms race, and for opening up its new directions rests with imperialism and only with imperialism. Imperialism, which was first to employ nuclear weapons, now is preparing to take the new and possibly irreparable step of shifting the arms race into space and taking aim at the entire planet."

Numerous bourgeois sociologists and politologists justify development of the latest kinds of weapons and substantiate the concepts of "acceptability" and "admissibility" of nuclear war and the possibility of a victory in it.

Theories have appeared in recent years using various "global" problems, particularly the struggle to preserve the environment and the need to regulate birth rate in connection with a "demographic explosion," for purposes of falsifying the reasons why wars arise. Some bourgeois ideologs assume that war will be an inevitable outcome of the "struggle for existence" of a rapidly growing population inasmuch as our planet's resources allegedly are being reduced more and more. Such reasoning logically leads to a recognition of the inevitability and perpetuity of wars, and consequently the very possibility of preventing them is refuted. This hampers a consolidation of peoples' efforts in the struggle for peace.

No less acute an ideological struggle also unfolded on the question of the essence of war and its link with politics. Bourgeois ideologs either are silent about or completely refute the link of politics of imperialist states with its material base, the economics of monopolistic capitalism; emasculate its class content; conceal its reactionary essence and give it an idealistic interpretation.

Militarization of politics is accompanied by politization of the means of violence, including nuclear weapons. For example, A. Weinstein, a West German military writer and advocate of the concept of "deterrence," writes: "Nuclear weapons are political weapons. . . . One can only threaten their use, and this threat has a deterrent force possessing almost a mythical might." It stands to reason that he is silent about the tragedy of Hiroshima and Nagasaki. Weinstein is echoed by other bourgeois ideologs. The book "Neoconservatism in the United States" states that "American military might is the deciding criterion in world politics."

Thus the dividing line between politics and war is eroded by militarization of politics on the one hand and by politization of the means of violence on the

other. The so-called "political war" waged with the help of subversive actions, blackmail and deception is included in the category of real wars.

The esssence of war also is falsified by isolating it from the politics of classes and states, as reflected in attempts to reduce war to a purely physical process of annihilation and destruction. Western theorists try to entirely remove the question of the responsibility of imperialism's politics for the wars it engenders and shift it to individuals. In particular, for example, this question is examined by them in numerous works devoted to the history of World War II.

The concept of "deterrence" is viewed in all military-political documents of the United States and NATO as the basis of their military policy. Bourgeois politicians and ideologs demagogically declare that implementation of this concept in the practice of imperialism allegedly preserves peace, strengthens security and prevents war.

Reflecting class interests of the military-industrial complex, the concept of "deterrence" substantiates a need for the constant use of military force in foreign policy. Policy conducted on this basis is based on blackmail, which does not preclude the direct use of conventional or nuclear weapons against socialist and progressive developing states. For example, in the words of American President R. Reagan, "in talks with the Soviet Union force is the most convincing argument, the U.S. trump card." The concept of "deterrence" reflects a desire of reactionary forces to erase the distinction between the threat of war and nuclear war itself, and it reflects the imperialist course toward attaining military supremacy and scrapping military-strategic parity.

The United States was the initiator in creating over 20 major weapon systems in the postwar period. The Pentagon has drawn up plans for creating some 40,000 new nuclear warheads over the next 10-12 years, including an increase in their number from 9,000 to 14,000, or by 60 percent, in strategic ICBM's. The United States already has overstepped the cumulative limit of 1,320 strategic ICBM launchers equipped with multiple independently targetable re-entry vehicles and of heavy bombers with cruise missiles provided by the SALT-2 Treaty.

The SDI program is closely linked with this concept, giving it an especially destabilizing character.

Reactionary circles of the West connect the "deterrence" concept with the desire to guarantee absolute security for themselves by destroying the enemy. It is not for nothing that even some bourgeois politologists call such a trend "a mortally dangerous security utopia." Numerous ideas perpetuating war prepared the ideological base for imperialism's aggressive foreign policy and military-strategic program at an official, state level. Above all this is the American doctrine of "flexible response," oriented toward preparing various kinds of imperialist wars: world and local, large and small, using nuclear and conventional weapons. There is a build-up in the might of NATO Armed Forces (which represent a certain "deterrent potential" and, objectively, a threat to peace and security of nations) in accordance with this doctrine.

The concepts of "limited" and "protracted" nuclear war are justly evaluated by the progressive world public as foolhardy and dangerous to the cause of peace and social progress. These concepts fan tensions and are used as a means of psychological warfare against the USSR and other peaceloving forces.

Genuinely just wars in defense of a socialist homeland and the achievements of proletarian and national liberation revolutions are subjected to especially refined falsification. Some western theorists peremptorily declare that "revolutionary warfare has an inherently amoral nature." Here they forget that Marxism-Leninism and life itself have shown that the just character of wars is dictated by the policy of foremost, revolutionary classes and that such wars are waged by them only when reactionary forces drive them to this.

In contrast to imperialism, which attempts to halt the course of history by force, socialism never of its own will linked its future with a military resolution of international problems; it actively promotes the security of peoples. Based on the conclusion of the 27th CPSU Congress that the policy of total opposition and military confrontation has no future, the Soviet people are a persuaded enemy of nuclear war in any of its versions. Our country has pledged not to be first to employ nuclear weapons. It favors removing all weapons of mass destruction from arsenals and limiting military potentials. This also was confirmed at the summit meeting in Reykjavik, at talks with the United States in Geneva, and in the New Delhi Declaration. No matter how great the threat to peace created by the politics of imperialism's aggressive circles, the CPSU Program states: There is no fatal inevitability of world war. We are deeply persuaded that peoples are capable of eliminating the threat of nuclear war and saving life on our planet through vigorous, purposeful actions. Development of the world revolutionary process and the upsurge of mass democratic and antiwar movements considerably broadened and strengthened the enormous potential for peace, reason and good will.

In connection with this one should note attempts by the imperialist reaction to disorganize the antiwar movement, turn it against Warsaw Pact countries and against the Soviet Union above all, and dislodge the enemies of world nuclear war from their positions. It is attempting to transform Soviet citizens' adherence to peace into pacifism. To these ends bourgeois propaganda calls on the populace of countries of the socialist community not to think about or be concerned over strengthening the defensive capabilities of their countries or increasing the combat readiness of the Joint Armed Forces of Warsaw Pact member states, and to refuse to perform the sacred civic duty of defending one's homeland and socialism's achievements, and it calls on the young people to refuse to perform military duty.

Party members have not been nor can they be pacifists. They are resolutely against unjust reactionary wars and the aggressive actions of imperialism, and at the same time they are for just actions of oppressed classes and nations and armed defense of the freedom and independence of peoples. They always are ready to come to the defense of socialism's achievements.

An analysis of the social-political essence of peace and the ways and means of preserving it also became a subject of acute ideological opposition.

The CPSU proceeds from the reality of our days: peace has become mankind's highest value; moreover, it has become a necessary condition for his survival on the planet. It stands to reason that this does not mean that other realities have retreated into the background. To the contrary, recognition of the right to freedom, independence and democracy, in short the right to social progress, comprises a mandatory precondition that a world cleared of nuclear weapons will become really safe, just and democratic.

But imperialist ideology is characterized by the desire to view the world through a sight notch and reduce international relations to an opposition of force and to balancing "on the brink of war." The correlation between peace and war is characterized in militaristic circles as "unstable" and concealing the constant possibility of both. Such an identification is a dangerous form of falsification making it easier for militaristic forces to violate the peace and unleash conflicts and wars.

The concept of a "balance of terror" by which it is shown that peaceful coexistence can be reconciled with the interests of militarism also is groundless and dangerous. This concept is oriented on the so-called "cold peace," which differs little from the "cold war." Speaking of this concept, CPSU Central Committee General Secretary Comrade M. S. Gorbachev emphasized: "The balance of terror ceases to be a factor of deterrence. This terror already is a direct participant of the arms race: it forms a vicious circle for fanning tensions by strengthening mistrust and suspicion."

The 27th CPSU Congress made an enormous contribution to the Marxist-Leninist concept of peace. It again persuasively showed the indissolubility of socialism and peace and of peace and creation, and once again demonstrated that the primary objective of Soviet policy is a safe and just world for all nations.

The party congress concluded that under present-day conditions the opposition between capitalism and socialism can take place only exclusively in forms of peaceful competition and rivalry. Assurance of security now has become primarily a political and not a military task. Security cannot be guaranteed for oneself if other states feel themselves threatened, i.e., security has to be all-encompassing. The concept of an all-encompassing system of international security formulated by the 27th CPSU Congress opens up a broad expanse for productive cooperation of all governments and public organizations. Inasmuch as the assurance of international security appears more and more as a political task, then it can and must be accomplished by political means. This is a new word in world politics, and it requires a new political thinking.

The CPSU implements steps to strengthen international security and increase the Soviet state's defensive capability on the basis of an objective class assessment of problems of war and peace in the nuclear age. The party has applied and will apply all efforts to see that the USSR Armed Forces are at a level precluding strategic superiority of imperialism's forces and that the defensive capability of the Soviet state is comprehensively improved and the combat cooperation of armies of fraternal socialist countries is strengthened. The new wording of the CPSU Program states that our Armed Forces must display high vigilance and always be ready to stop imperialism's intrigues.

It was emphasized at the 27th CPSU Congress that under conditions where imperialism is carrying out open political and psychological preparation for a world war our ideological work needs to be offensive both with respect to exposing ideological subversive activities and getting truthful information to the people about socialism's real achievements, the USSR's policy and the socialist way of life.

A profound mastery of the ideas and new lines of the 27th party congress and the Marxist-Leninist method of understanding the problem of war and peace allows reinforcing the ideological indoctrination and class conditioning of military cadres and the methodological preparedness of air commanders, political officers, pilots and aviation specialists; it allows purposeful ideological work with personnel in the interests of strengthening aviators' morale in every way and maintaining constant vigilance and high combat readiness of Air Forces units. Combat readiness is incompatible with pacifism. An increase in the scale of U.S. and NATO military preparations gives no grounds for self-complacency; it demands that airmen employ a set of countermeasures which would reliably disrupt any aggressor's treacherous attack and ensure his defeat.

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CAREER OF TEST PILOT YAMSHCHIKOVA

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 3, Mar 87 (signed to press 2 Feb 87) pp 12-13

[Article by Lt Col (Ret) P. Guskov under rubric "Tales of Fighter Pilots": "Fighter and Researcher"]

[Text] On that 1 May 1943 holiday 586th Fighter Regiment personnel assembled at a front airfield for a short meeting where the regimental commander read the Supreme Commander's May-Day order. Squadron Commander Sr Lt O. Yamshchikova asked to speak.

"Improving combat training every day is one of the chief tasks the Supreme Commander has set for us. Whoever ceases to learn unquestionably will fall behind, and as you know, the laggards are killed," she said with conviction, ending her brief statement. "We cannot allow them to destroy us. We are obligated to hold out and win!"

Squadron Commander Yamshchikova constantly perfected her expertise and persistently taught subordinates expert flying and the techniques for conducting aerial combat.

The regiment was rebased to a Kiev airfield in 1943 and received the mission of screening the city and the Dnieper crossing against fascist air raids. One December morning a report came in to the command post that a large group of bombers with fighter cover was heading for the crossing at an altitude of 4,000 m. A green flare soared into the sky. That day Olga Yamshchikova was paired with Aleksandra Akimova on alert. The pilots started their engines and took off. They approached the crossing in time: the first group of fascist aircraft had appeared from the southwest.

"Let's attack the leader," Yamshchikova radioed and put her fighter into a dive.

The lead bomber blazed up from an accurate volley and the enemy formation broke up, but a flight of Messerschmitts already had closed with the daring pilots. The situation became heated.

"Hold on, girls!" they heard a brisk male voice over the radio.

These were fighters from the adjacent airfield coming to their help. The sky became crowded. Fierce aerial combat broke out. The fascist bombers dropped their bombs into the Dnieper and turned back. They lost 17 aircraft in this action, not one bomb fell on the crossing, and our fighters had no losses.

The fighter regiment in which Olga Yamshchikova fought battled its way from Stalingrad to Vienna. She took part in actions in the skies of Stalingrad and Voronezh, Kursk and Kiev. She was seriously wounded and was decorated with the Order of Patriotic War 2d Class, three orders of Red Star and medals for courage and valor.

In early 1945 Capt Yamshchikova was placed on temporary duty for test work in the NII VVS [Scientific Research Institute of the Air Forces]. The entire regiment saw her off. Regimental Commander Maj A. Gridnev said in parting:

"Remember, Yamshchikova, you are a frontlinesman and a fighter pilot. Don't let us down!"

Olga Nikolayevna's path to becoming a test pilot was not easy. This was considered strictly a male profession and no woman before her had dared such a risky job. She had to work to affirm her right to this difficult but romantic profession.

Initially there were flights in the Yak-3 in which she fought at the front; then she was assigned to fly with an experimental oil system at high altitude. There were also check tests of the Yak-9 with a camera at different power settings. At first glance the work was most commonplace, but very interesting. Olga was proud and satisfied. Experience and knowledge gradually accumulated and she gained authority in the group of test pilots. As with every pathfinder, there were many different instances where she needed supreme self-control and professional expertise. For example, once in the second half of a take-off run when the aircraft was just about to separate from the ground Olga sensed that the control stick had jammed. Immediately throttling back, she aborted the take-off. Then she saw a bomber taxiing onto the strip. It seemed a collision was inevitable, but she managed to turn to the right at high speed and her fighter darted beneath the bomber's wing.

There was an instance where the igniter did not function in coming out of a spin during a test of antispin rockets. The aircraft was falling; the pilot was trying to take it out of the spin and was mechanically counting the turns. After the thirtieth turn, when it became clear that it was no longer possible to leave the aircraft and use a parachute, she still managed to stop the rotation and take the aircraft out of the dive almost at the very ground. The aircraft was saved and this helped the designers identify the reason for the malfunction and perfect the antispin rockets.

A flap tore off on Olga Yamshchikova's aircraft when she was coming in for a landing after another flight. The aircraft was tossed sharply onto its wing but the pilot reacted instantaneously and made the landing safely. She acted courageously in any situation, preserving self-control and displaying supreme flying proficiency in order to preserve costly equipment.

Jet aircraft began to replace piston-engine aircraft after the war. The Yak-21T was the first jet aircraft which Yamshchikova tested. She took it up after a thorough study of the design. The flight was approaching the end and everything was going well, but then the front support remained locked when the landing gear was being lowered. Repeated attempts led nowhere. The pilot decided to open the lock with the emergency release handle. She pulled on the handle but it didn't give. She jerked with all her might and broke the line. The situation became complicated. Landing without the front wheel meant nosing over on the landing run.

"Start, request permission to depart for the zone," she requested the flight controller.

On receiving the okay she entered the flight training zone and decided to test one final method. In coming out of a dive with g's from which everything was going dark before her eyes, she placed the undercarriage valve on release. It happened on the third try: the familiar sound of supports locking and green lights notifying her that everything was in order and she could go in for a landing.

On USSR Air Fleet Day in 1947 Capt Yamshchikova participated in a parade of jet aircraft above her home Tushino Airfield as part of a flight of nine led by famed fighter pilot Col P. Stefanovskiy.

She studied in the Central Flight School for Instructors and received the instructor-pilot title at Tushino in the early 1930's after initial training in the Leningrad Air Club of Osoaviakhim [Society for Assistance to Defense and the Aviation-Chemical Industry]. Later there was the Central Higher Parachute School, where she made more than 80 jumps in three months and became a parachute sport instructor.

After the school Olga Yamshchikova became a flight commander in the Leningrad Air Club. Over 50 pilots and 100 parachutists are obligated to her for their development. Among them are HSU and Honored Test Pilot USSR Col G. Sedov and Test Pilot V. Boychenko. She took a great interest in glider flying in the air club. Together with her friends Lyudmila Chistyakova and Yelena Karateyeva she was part of a women's glider train towed by an R-5 aircraft piloted by Vera Struchko which took part in a flight from Leningrad to Koktebel for the 11th All-Union Fly-In. The girls covered the 1,950 km in 13 hours, 40 minutes, which was a world record for a long-distance glider flight.

In 1938 the Leningrad Obkom of the Komsomol and the Komsomol Central Committee recommended Yamshchikova for studies at the Air Engineering Academy imeni N. Ye. Zhukovskiy. Olga continued to fly while mastering the difficult theoretical course, and this played its role in her appointment to a position after completing the Academy. With an engineer's diploma, she received an assignment to one of the aviation plants in May 1942. Here she had to make trial flights of aircraft destined for the front and accept them herself as a military representative.

Her rebellious nature demanded vigorous actions, however, and Olga repeatedly requested to be sent to the army in the field, but the command authority

refused. After being notified about the death of her husband (also a pilot), Olga made this request again and this time her application was signed. That is how she became a squadron commander in the newly activated women's fighter regiment in which she fought almost to the end of the war.

Later came work in the Scientific Research Institute of the Air Forces, where Olga Nikolayevna conducted advanced tests to determine flight performance and to check the working capacity of various equipment and weapons and of individual systems and hardware; check tests of series aircraft; and state tests of experimental aircraft. As the test pilot best trained in methodology, she was repeatedly sent to line units by the command authority to assist flight personnel in mastering new jet aircraft, and she coped successfully with this task. Many pilots such as well-known pilot Marina Popovich, who flew supersonic fighters and the heavy Anteys and set 13 world records, consider her a good mentor.

Col Yamshchikova has flown some 3,000 hours without having had a single accident or equipment breakdown. More than 40 modifications of different types of aircraft have passed through her hands. She gave 25 years to flying. The Order of Labor Red Banner was added to her frontline awards for the contribution she made to our aviation's development.

But flying life is such that sooner or later one has to part with a favorite profession. Once an entry appeared in Olga Nikolayevna's medical record after the latest medical flight board: she was not authorized to fly because of health. It was of course sad, but then she was not only a pilot; she was also an engineer. Subsequently she worked as an engineer and then as a leading test engineer for 15 years. Her enormous flight experience permitted her to delve deeply into design features, solve various research problems and give effective assistance to designers in finishing equipment.

Col Yamshchikova performed extensive public work in addition to her immediate duties. For example, in the 1970's many girls were striving for aviation and wished to acquire the flying profession, but for well-known reasons it was far from simple to acquire. However that may be, flying work is not quite a woman's job. Many girls turned for help to Olga Nikolayevna. At her petition the Ministry of Civil Aviation organized An-2 training at the Kremenchug Flight School for a group of women sport pilots of DOSAAF aviation sports clubs. When the girls completed school the command authority invited Olga Nikolayevna to graduation exams. After all ceremonies were over the graduates were photographed and gave her a photograph with the inscription: "In memory of our wise, kind, and famous mentor Olga Nikolayevna Yamshchikova from happy pilots. Many thanks for everything you did for us." This inscription means that in life one can always find one's place if there is a precise objective, will and determination.

Olga Nikolayevna Yamshchikova brought up two daughters. Her active nature knew no rest until her very last days. She was a welcome guest in schools and in production and worked a great deal to propagandize the glorious traditions of Soviet aviation.

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EMERGENCY AND SURVIVAL TRAINING OF PILOTS STRESSED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 3, Mar 87 (signed to press 2 Feb 87) pp 14-15

[Article by Maj Gen Avn Yu. Bondarenko under rubric "Implement 27th CPSU Congress Resolutions!": "Under Extreme Conditions"]

[Text] The party's deep faith in the Soviet citizen's inexhaustible forces persuasively sounded at the 27th CPSU Congress. "Above all we must set in motion to the full extent the principal and essentially inexhaustible reserve consisting of the human factor," noted materials of the party forum. Activating it and ensuring that every aviator in his place acts vigorously and to the utmost represents the main path for increasing the intensiveness and effectiveness of combat training and the quality and safety of flights. It is of especially great importance to consider physiological and psychological factors in flight personnel's actions under extreme conditions.

Each time he goes up a pilot experiences sensations which cannot be compared with anything else, but flying is not just connected with romance. It is above all difficult work requiring physical and emotional forces, the firm psychophysiological conditioning of all aircraft or helicopter crew members and their constant readiness for actions in an unexpected situation.

No matter how sophisticated the equipment, aviators can end up in a difficult situation both in an ordinary training flight and in performing a combat assignment. This is shown by examples from flying practice.

A person's psychophysiological and moral readiness to staunchly endure all difficulties is of enormous importance for achieving success under extreme conditions. It is very important to be able to concentrate and not give in to fear, but to gather all forces and will and preserve the ability for further decisive actions in the interests of performing an assigned mission.

The pilot's profession is rightly regarded as among the most courageous and heroic. It is not for nothing that the people proudly call those who take aircraft of various classes and types up into the boundless fifth ocean winged heroes.

During the Great Patriotic War thousands of military exploits were performed by our military pilots in destroying elite fascist aces.

Victory did not come easy; it was achieved at the cost of irreplaceable losses, shed blood, and the supreme staunchness of flight and engineering-technical personnel. Character and will, professional expertise and firm discipline, and allegiance to friendship helped our pilots battle daringly in the flaming sky. When they found themselves in the most critical situations they found the strength in themselves to survive, overcome all adversities and deprivations, return to combat formation and capably strike the hated enemy.

Every aviator knows well the legendary exploits of HSU's and test pilots A. Maresyev and Z. Sorokin. Good air schooling, a thorough knowledge of aviation equipment and armament, high moral-combat qualities as well as the gigantic strength of spirit and coolness of Soviet aviators permitted them to emerge from the most difficult situations with dignity. These qualities are formed in flight personnel in the course of training by means of persistent, purposeful party-political work. In taking off, the only pilot who can count on success is the one who has a strong will along with detailed knowledge and firm skills. By their actions our aviators repeatedly proved that enormous spiritual potential is contained in a person and it is displayed in particular in minutes of serious danger.

Let us recall the exploit of military pilot Capt Yu. Kozlovskiy. His engine failed during a training flight. Soon came the command from the ground: "Eject!" The pilot executed it precisely, but the landing was extremely unsuccessful: he fell on sharp rocks and broke both legs.

What was he to do? Yuriy began a fight for survival from the very first minutes. There was neither a light nor a single reference point around. Kozlovskiy was a prisoner of cold hills immersed in the gloom of a freezing night and silence.

First of all he tried to stop the bleeding by binding his legs with tourniquets. He looked around and crawled in what he assumed was the direction of the road. Several times he heard the noise of helicopters which were trying to locate him.

It took Kozlovskiy around one and a half days to make his way to the road while overcoming piercing pain and fatigue... He was not only fighting for his own life; above all he was performing his duty. How much physical and moral effort was demanded of him! But he couldn't act otherwise. Later the physicians would say that Kozlovskiy overcame almost the impossible. And how many different operations he endured! Nevertheless he survived and won.

Thanks to enormous force of will Yuriy Kozlovskiy managed to withstand an exceptionally severe ordeal. Having gotten into an extreme situation, the officer did not give in to fear or weak will but managed to emerge from a most difficult spot with honor while displaying supreme tenacity and self-control.

Air commanders, political bodies, staffs, and party and Komsomol organizations unquestionably must prepare aircraft and helicopter crews for actions in extreme situations and for successful performance of any flight missions under

the most unfavorable weather and climatic conditions. Accomplishing this important mission is an imperious demand of the time stemming from the interests of improving the combat readiness of flight crews.

It is common knowledge that flying work places an inherently high stress on a person's mental and physiological functions, especially under extreme conditions. This involves many factors: a rapid development of aviation equipment and weapons used on aircraft and helicopters, an improvement in tactics, and active use of aircraft to accomplish diverse combat and training missions. This is why it is so important to form a "safety margin" and psychological stability of the pilot's body and spiritual and combat qualities under present-day conditions. To this end we obviously should make more active use of a comprehensive program of physical and special training and improve the means of rescuing, locating and evacuating flight crews from forced landing sites.

In addition to increasing one's endurance, purposeful physical training helps develop an ability to get one's bearings not only in flight but also on the terrain, distribute attention correctly, and develop quick reactions, boldness and decisiveness.

Our press reported the incident involving Officer V. Smagin. While performing a flight assignment he was forced to abandon the aircraft and came down in the sea. The officer was in freezing water for seven hours. USSR AMN [Academy of Medical Sciences] Academician G. Sidorenko said about this:

"The incident with Aviator Valentin Smagin unquestionably can be categorized as exceptional in medical practice. The exceptional nature is without doubt a result of the officer's uncommon volitional qualities. Suffice it to recall that a person's stay in water with a temperature of from 0 to 10 degrees for more than an hour very often ends fatally."

Several years before this incident Capt I. Kunitsyn ended up in a similar situation, and he also endured in the struggle against the elements by displaying his best qualities.

Experience indicates that those pilots who have undergone special training and therefore possess high psychological stability, and who are able to make a competent decision and embody it in correct actions have more chances to survive under extreme conditions. In addition, one must know a great deal and possess appropriate skills and a certain expertise. This is confirmed by the experience of our aviators who serve in the limited contingent of Soviet troops in Afghanistan.

Someone possibly will think that the crew was lucky. In some respects, yes! But the chief factor is something else. One couldn't hope for a confluence of circumstances or a happy outcome in the difficult situation in which the aviators found themselves. They knew that only vigorous, decisive and competent actions as well as high morale could save them.

It is not in vain that much attention has been given to this urgent problem in recent years. Appropriate programs and methodologies have been drawn up and unique centers have been created where flight personnel undergo training and receive survival skills in case of a forced landing or damage to the flying craft while performing a flight assignment.

An analysis of this work in appropriate Air Forces organizations as well as higher educational institutions showed that the level reached in some of them in preparing flight personnel for actions under extreme conditions does not yet conform to those capabilities and reserves which we have; this naturally reduces the crews' moral-psychological readiness for flights.

The important thing now, as noted in 27th CPSU Congress materials, is to achieve a turning-point in the work in accordance with Congress resolutions and attain higher goals with lesser inputs. It was noted at the January 1987 CPSU Central Committee Plenum that the party firmly figures that all Armed Forces personnel will act with supreme responsibility and will raise and improve proficiency and combat readiness... The realization of potential capabilities which people possess now is the principal task in preparing flight personnel for actions under conditions of an autonomous existence. Special trainers and other equipment should be fabricated, the methodology of classes both with flight personnel and engineering-technical personnel should be improved, a serious approach should be taken to the physical training facility, and visual aids should be put out with an aim toward solving this problem.

Therefore in the new training year subunit leaders, staffs, and party and Komsomol organizations must give very serious attention to this matter in training flight personnel, and must resolve this important problem more vigorously and with consideration of the experience gained in order to further improve the combat readiness of crews, subunits and units.

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OFFICERS' PERSONAL EFFORTS REWARDED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 3, Mar 87 (signed to press 2 Feb 87) pp 16-17

[Article by Lt Col P. Klebanyuk, deputy unit commander, 1st Class specialist, under rubric "For the 'Heirs of October' Contest": "Range of Search"]

[Text] Dusk was closing. The discordant roar of jet turbines died away: the tactical flying exercise had ended in the military transport regiment. In the communications equipment van, however, there continued to be a great deal of work: reports were coming in one after the other which can be neither garbled nor delayed in delivery to the addressee. A strained atmosphere still reigned in the radio crews, and just a minute of limbering-up directly at the work station infused new energy.

Battalion Commander Lt Col Ye. Tolpik loved the strenuous rhythm of combat work. In his years of service he had firmly learned that this rhythm, multiplied by the high quality of radio and telegraph traffic and equipment maintenance, brings good fame to aviation communicators.

After attentively measuring transmitter output parameters once more together with the young officer, Tolpik left the radio station panel and, casting a glance at his watch, began to hurry: he had to visit the other crews and then assign his subordinates a new mission for relocating.

En route to the command and staff vehicle Tolpik looked around at the radio station dusted with snow. Steep-faced and with a telescopic antenna raised above the vehicle cab, it was beautiful in its own way. A military transport aircraft stood in the distance on the pad of the field technical maintenance unit. Powerful and swift in flight, on the ground it retained its previous flight carriage in the outlines of wings, engines and stabilizer.

Tolpik recalled his service in the Air Forces, with which he was wholeheartdly linked. Much time had passed since he had donned the uniform with blue collar tabs and a lieutenant's shoulderboards. The years of officer development and the time of coming to manhood remained far behind. His temples were graying but his heart continued to thirst for good achievements and to be dissatisfied with what he had achieved.

There are many people in aviation genuinely interested in their chosen profession. Lt Col Yevgeniy Frantsevich Tolpik is such a person.

"We remedied the malfunction," the captain reported.

"Then just what troubles you?" inquired Tolpik, rising and looking questioningly at Pshenishnyak.

"The radio has to be at the far range tomorrow," said the company commander. "But the malfunction in it showed up again. We're looking for the reason, but no luck as yet..."

"Well," said Tolpik more softly, "let's go look together."

The officers emerged from headquarters. A cold wind burned their faces. While they were proceeding to the radio station, Yevgeniy Frantsevich recalled how at first Pshenishnyak was constantly consulting with him or the deputy for technical affairs. At that time the young officer carefully heeded the advice, but very rarely suggested something on his own. It would happen where after discovering some trouble he would immediately report this to his superior. No, not out of overcautiousness: he reported in a timely manner so that others could think how to take steps, he would say. He simply lacked experience. From his first days of duty in the subunit, Pshenishnyak was distinguished by great working capacity and a high sense of responsibility, but genuine experience in servicing what was for him new equipment did not come at once.

Once after completing periodic technical servicing on the equipment Tolpik and Pshenishnyak headed for headquarters.

"What duty we have," uttered Tolpik as if by chance. "It may be different for others, but I dare say that my family soon will kick me out of the apartment. Apparently I haven't learned to properly organize my work, and I often have to hang around."

"That isn't your fault," responded Pshenishnyak, realizing where the battalion commander was leading. "We have many party members in the subunit, and how often do we raise the question at meetings about personal responsibility for the assigned work sector? Our duties are precisely spelled out and delineated by regulations and orders. The only thing not indicated is which matters we have to resolve ourselves and which with the active participation of other comrades. So it happens that at times we distract each other on trivial matters. I'm not speaking about excessive coddling. Much obviously has to be revised here even in competition..."

The company commander's reflections suited Tolpik, who agreed with the officer.

"It wouldn't be superfluous, I think, for all our party members to find out about this," said Yevgeniy Frantsevich. "It is much easier to accomplish matters together."

Soon a party meeting was held, which took place in a spirit of the high demands of the 27th CPSU Congress. Speakers talked exactingly and frankly about their miscalculations and unused reserves, about raising every party member's responsibility for exemplary performance of his party and official duty during the reorientation, about fulfilling socialist pledges, and about the fact that party members above all must display more initiative, creativeness and independence in work.

After the meeting subunit competition unfolded with new force under the motto "We will fulfill 27th CPSU Congress resolutions and will mark the 70th anniversary of the Great October with selfless military labor!" The competition leaders were party members Capt Pshenishnyak, Sr Lt A. Sokolov, Lt Yu. Shishkin and others. The leaders used personal example to draw their colleagues into the struggle for a further increase in combat readiness of crews and duty shifts and for effective operation of communications equipment. A differentiated approach was taken toward organizing personnel rivalry: by the soldiers' specialties and by service tasks. This noticeably improved competition effectiveness.

But there still are unresolved matters. For example, competition results must be summed up daily in the radio crews and in the squads. Unfortunately, however, people who distinguish themselves sometimes are remembered only on the following day, usually at a formation and then in passing, and sometimes even a week later.

In chatting with Party Member Pshenishnyak once on this topic, Lt Col Tolpik remarked:

"Some commanders usually refer to a heavy workload."

"We really do have a great deal to do each day. Just try to find time! Sometimes there is no time to briefly assemble the people," responded the officer.

Tolpik looked at him intently, then quietly continued:

"But that is not a convincing argument, and here is why. It takes only a few minutes, say in breaks before going on duty or after duty, in order to recognize subordinates' zeal in service and activeness in competition."

Yevgeniy Frantsevich was silent for a minute, collecting his thoughts, then began speaking more fervently and persuasively:

"And here don't analyze each person's pluses and minuses thoroughly. The people themselves see who is working how. Something else is important--to determine the leaders and laggards by a commander's decision, call on the others to line up on the leaders, and show those losing the competition ways to eliminate miscalculations."

At that time there really were discrepancies in the subunit. For example, the commander made the decision to hold a special tactical class. He defined the

tasks and exercises the personnel were to perform and informed subordinates of the objective and procedure of actions, but the personnel often forgot to make specific pledges, orienting only on those they made at the beginning of the training year.

Now things are different in the subunit. It is in daily acute comradely rivalry that the fate of the basic combat training indicator--its effectiveness and quality--now is decided. And one other facet of competition is revealed here: the desire not only to move forward oneself, but also to draw up a laggard.

In saturating the personnel's training with elements of competitiveness, Lt Col Tolpik thus creates conditions for each soldier to display his own abilities more vividly. As a result subordinates know well that all pluses and minuses of their work invariably will be analyzed and publicized. Each one tries to find reserve seconds in the norms.

Lt Col Tolpik, his political deputy Maj G. Raylyan, and other party member/leaders succeeded in creating an atmosphere of comradeship and mutual help in the collective. Each soldier follows the achievements of his partner in competition with interest and tries not to fall behind. Competition is organized here monthly for the titles of "Best Specialist" and "Best Crew." A "Best Platoon" challenge pennant also has been instituted. Sr Lt A. Sokolov's subordinates have held it repeatedly. Visual agitation materials constantly inform soldiers of those who are in the lead and about how matters stand in neighboring subunits.

Praise, a warm word and commendation for military labor prompt people to work even better. Hence it is understandable that moral stimuli represent the very same reserve for improving socialist competition's effectiveness, efficiency and positive influence on end results of the training and indoctrination process. Therefore those in the subunit always strive to see the specific person with his character, inclinations and abilities.

The people here constantly remember that only precise organization of competition can identify reserves, arouse people's creative energy and lead them to victorious goals. From the very first days of the new training year the battalion commander and political officer constantly relied on the help of party and Komsomol organizations in this important job. By their personal example, party members and Komsomol buro members draw all personnel after them into the struggle for quality accomplishment of assigned missions.

The unit gives very serious attention to the indoctrinating role of the competition leaders' example and to a broad demonstration of their work techniques and methods. Officer Tolpik and other subunit commanders and political officers are given great help in this by the party committee and methods council, which generalize and disseminate the experience of the best people promptly and rather efficiently. For example, Sr Lt A. Sokolov was able to become a master of communications, which the party committee and methods council did not fail to note. Sokolov's experience was studied thoroughly. After this the specialists drew up specific recommendations for the personnel. In implementing them the commanders began teaching officers

and warrant officers foremost techniques in servicing and operating radio and other communications equipment and organizing jobs in a complicated jamming and tactical situation.

In addition to scheduled practices with the officers there are special theoretical seminars on a knowledge of the specifics of electronic warfare and the probable enemy's tactical capabilities. Progressive methods for improving the professional expertise of commanders, especially young ones, are producing tangible results. All subunit officers and warrant officers now are coping precisely with their duties and are training subordinates effectively. The rapid development of young officers became possible because all necessary conditions were created for this.

From his first days of duty in the subunit each young officer is given a specific time period for studying what is for him new equipment, the organization of station operation duties, and preparation of subordinates for alert duty. It has become a tradition that young officers take tests and receive authorization for independent performance of their duties on the equipment ahead of schedule.

Officers' military-technical combined games are a serious help in training commanders and political officers. They represent a struggle for the title of best specialist, a struggle for successful performance of various tactical procedures, and the practice of many other norms. The meaning of such combined games is to arouse people for constant, painstaking, systematic, independent training and for expanding their ideological-theoretical, military-technical and operational-tactical horizons.

Tolpik wearily leaned back in his work chair and pondered for an instant; Capt Pshenishnyak continued to examine the diagram and then discovered the ill-fated defect. The political deputy came over.

"Go have supper and rest," he said. "I would say its better to come in a little earlier tomorrow than to rummage until midnight in semidarkness. The commander instructed that another station be scheduled for duty..."

Tolpik agreed, but in his heart he decided to remedy the defect without fail today after supper.

Returning to the radio station late that evening, the officers again connected the monitoring and measuring gear to the radio circuit and continued the inspection by the method of excluding serviceable components and circuits, recalling instances similar to this as they went and the procedure by which the trouble was remedied.

"Well, that appears to be it," sighed Yevgeniy Frantsevich in relief when the trouble was eliminated. Only now did he sense how numb his body had become from fatigue, but he didn't give a sign of this.

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SQUADRON FLIGHT SAFETY CAMPAIGN EMPHASIZED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 3, Mar 87 (signed to press 2 Feb 87) pp 18-19

[Article by Lt Col V. Gorlov, 1st Class military pilot, under rubric: "Flight Safety: Experience, Analysis, Problems": "Through Common Efforts (Discussion of the Article 'The Sky Does Not Forgive Mistakes'"]

[Text] It is a task of state importance to preclude flight accidents and their preconditions. Accomplishing this helps elevate the air training and combat readiness of air units and subunits to a higher level. Flying practice convincingly indicates that if problems of flight safety are resolved comprehensively through the efforts of all personnel, then success invariably is achieved.

In the article entitled "The Sky Does Not Forgive Mistakes" published in the first issue of AVIATSIYA I KOSMONAVTIKA for this year, Lt Col V. Antyufeyev rightly asserts that assurance of flight safety is a difficult job requiring joint efforts by commanders, political officers, and party and Komsomol organizations.

Our squadron party buro is in fact the commander's combat assistant in accomplishing tasks concerning the personnel's life and service. It strives for party member/aviators' strict compliance with established flight safety rules prescribed by appropriate flight training documents and motivates them for a thorough study and skilled operation of aviation equipment. Party members purposefully and knowledgeably perform systematic preventive work aimed at timely identification and elimination of the causes which engender preconditions for flying accidents.

Such objective concern of the party collective is producing tangible results. There have been no flying accidents or their gross preconditions in the squadron for a long time, but the party members do not consider what has been achieved to be the limit. Questions of ensuring flight safety occupy a central place in the party organization's work, and they have been discussed more than once at party meetings in one form or another.

I recall one meeting at which a briefing was given by Lt Col Yu. Chernyak, a party buro member and head of a methods council section. He used specific facts to show that although there have been no flying accidents in the

squadron, the problem of flight safety nevertheless continues to demand very fixed attention. Many CSPU members, among them officers S. Khmelevskiy, V. Kustikov, A. Demidov, V. Makarov, P. Andriyanov and others, participated in discussing the briefing. They spoke with identical responsibility and concern about flight safety, which concerns everyone. The essence of their statements reduced to the fact that we should not await reorientation from above or from outside, and that above all every party member himself must do everything out of conscience and with great responsibility; then there will be no violations of the laws of flight duty.

Yes, the conversation at the party meeting was businesslike and self-critical. Party members assessed their own contribution toward assuring accidentfree flight operations from the standpoint of high exactingness, and they determined future tasks.

They began fulfilling the resolution adopted at the meeting without wasted motion. Our flight's party members, for example, held talks in which they explained to colleagues the need for a sharp increase in personal responsibility for high quality in performing every flight assignment and for strict observance of the requirements of guidance documents regulating accidentfree flight operations.

It now has become the rule in the flight as well as in the entire squadron to regularly analyze crew training in different kinds of flight training. This is done by detachment and flight commanders. Data obtained are depicted graphically in a special display. A system for determining the crews' coefficient of readiness for flights also has been worked out precisely. A chart is constantly kept on the flight personnel's landing errors.

It is also noteworthy that assignments for independent training are planned for the aviators and worked in advance with consideration of each person's state of training. Strict supervision has been established over the flight personnel's improvement of professional knowledge and skills. These and other innovations adopted in the aviators' combat training practice at party members' initiative permit arranging it more effectively and dynamically.

The squadron commander, his political deputy and the squadron party organization do a great deal to see that flight, detachment and crew commanders are in the lead in the flight safety campaign, that they set the example of businesslike efficiency and principle and of strict, precise compliance with requirements of military regulations and flight documents, and that they are the example in service and training. We have many such party member/leaders, one of whom is crew commander Maj E. Adashkevich. He is irreconcilable toward everything hampering combat training and having a negative effect on an improvement in air training and the zealous operation of aviation equipment. Experience and high professional expertise help him emerge the winner from difficult situations. I will give an example.

Once during take-off WO A. Sedogin, an air gunner in Maj Adashkevich's crew, erroneously activated the after-hatch emergency opening valve instead of the oxygen valve. It was impossible to close the hatch in flight by the usual method--that is how the system is arranged. It was a serious situation. What

should be done? Of course, they should have landed and looked into everything on the ground, but Adashkevich arrived at another decision, a nonstandard one, frankly speaking. After consulting with the senior flight technician, he suggested disconnecting the air supply coupling to the emergency system cylinder and then closing the hatch from the primary hydraulic system. Capt V. Sklyarov did this in a way which could not have been bettered, and an important mission was not disrupted.

At times a particular commander's successes are explained by luck. He works just the same as others and doesn't stand out in any special way, people say, but that is only at first glance. As a rule, such a commander is distinguished by analytical thinking and an ability to delve into the essence of phenomena and facts, draw proper conclusions from them, and work concretely, objectively and with a long-range view. In our flight Maj V. Povorov and Sr Lt A. Milonov are just such commanders. The crews they command are outstanding. The specialists in the crews are responsible people and perform their duties conscientiously. It is well known that any work succeeds where people display activeness and initiative, and where they take every job to completion without fail and work conscientiously.

It stands to reason that it would be a hundred times more difficult for each of us were we not to feel the constant businesslike help of the squadron party organization. The living tie of party member/leaders and party activists with the airmen permits seeing everyone, knowing everything, faultlessly determining the status of flight safety in any flight, detachment or crew, taking timely steps to prevent mistakes and coming to the assistance of those experiencing difficulty.

In my view, squadron party buro members act very correctly in systematically studying the state of affairs on the spot and hearing accounts from party members about their personal example in complying with the laws of flight duty. This is also necessary for generalizing foremost experience. Accounts about party members' personal responsibility for complying with the laws of flight duty and for quality preparation for performing flight assignments were of great benefit, for example. They heard from Flight Commander Maj V. Losev and from Lt V. Churichev, the party organization secretary of this same collective.

Recent party buro sessions heard announcements from IAS [aviation engineering service] specialist Capt V. Ostroverkh on measures for strengthening flight, military and technological discipline and from Maj A. Borodin on the aircraft commander's role in ensuring flight safety in the crew. There was also discussion of the question of the methods council's role in improving personnel combat training and ensuring flight safety. Resolutions adopted reflected all aspects of a further improvement in the organization of squadron flights and an increase in their quality.

Just what changed after these party measures? More thought began to be put into organizing the aviators' combat training and a sharper aim was taken at achieving a certain end result. Demands rose on party members for ensuring a vanguard role in flights and for complying with safety measures on the ground and in the air.

I also would like to emphasize the following. Often someone links the flight safety campaign with some additional organizational structure. The practice of flight operations in our squadron makes it possible to see that many reserves lie above all in the people themselves and in their mood. This hardly means that there is no need to search for more effective use of forces; reorientation must be carried on comprehensively along all avenues. But I believe it is very important to bear in mind here the aviators' combat mood, the party members' mobilizing role, and the cohesive and capable actions of commanders, political officers, and party and Komsomol organizations in further improving the collective's combat readiness.

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LANDING, GROUND VISIBILITY RELATIONSHIP ANALYZED

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[Article by Col (Res) V. Nesteruk, candidate of geographical sciences, under rubric "Flight Safety: A Specialist's Advice": "Landing Visibility"]

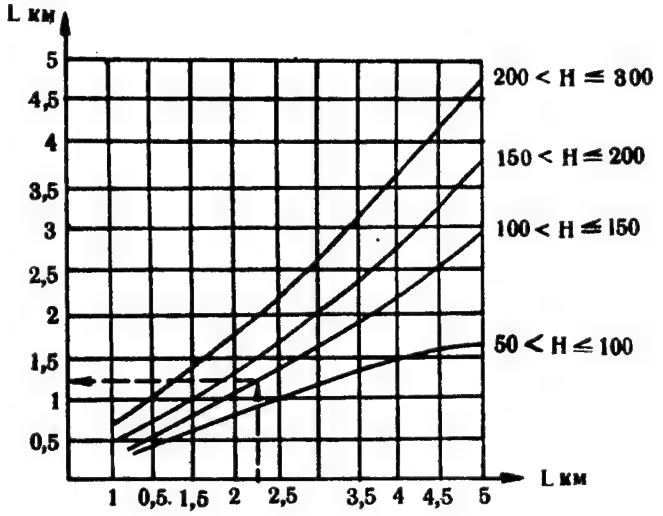
[Text] Modern radiotechnical equipment permits executing the primary portion of the glide path maneuver outside visibility of ground reference points, but the pilot shifts to visual flying at a certain altitude. It must be remembered here that in the overwhelming majority of cases landing visibility does not coincide with ground visibility at the Earth's surface, which is explained by the diffusion of light on aerosol particles of natural and manmade origin. This distinction is manifested most clearly in the presence of clouds below 200-300 m and of a surface inversion. Nevertheless, in the practice of providing meteorological support to flights, landing visibility often is identified with ground visibility, and this is inadmissible for flights in adverse weather conditions.

Flight experiments were conducted with the objective of determining the relationship between ground and landing visibility with differing lower cloud boundary altitudes. During the experiments, landing visibility and lower cloud boundary altitude were evaluated on a glide path with the help of a helicopter. Ground visibility was determined along the runway. In constructing correlative charts it was determined that the relationship between landing and ground visibility can be described by a quadratic polynomial: $L=al^2+bl+c$, where L is landing visibility; l is ground visibility; a, b, c are equation coefficients.

Computer calculations led to the following regression equations connecting landing visibility with ground visibility: $L=0.0291^2+0.7161+0.133$ with a cloud height of 200-300 m; $L=0.0471^2+0.4341+0.261$ with a cloud height of 150-200 m; $L=0.0431^2+0.2801+0.196$ with a cloud height of 100-150 m; $L=-0.0161^2+0.3851+0.047$ with a cloud height of 50-100 m.

A nomogram was constructed based on these equations (see diagram). The ground visibility values in the 0-5 km interval are laid off on the x-axis and the corresponding landing visibility values are laid off on the y-axis. Faired curves are plotted every 50-100 m for each gradation of the lower cloud boundary height.

Let us explain in an example how to determine landing visibility from the nomogram. Let the lower cloud boundary height be 120 m and ground visibility 2.4 km. We go up vertically along the curve corresponding to a lower cloud boundary of 100-150 m from the visibility value of 2.4 km on the x-axis and obtain a landing visibility of 1.2 km on the y-axis.



Номограмма определения посадочной видимости.

Landing visibility nomogram

The nomogram makes it possible to evaluate landing visibility before the weather reconnaissance aircraft takes off or the decision is made to receive crews.

Aircraft landing speed is important for evaluating landing visibility, since the time a pilot has to discover the runway depends on it. For this reason a transport aircraft pilot has more time to discover the runway than a fighter pilot and so they evaluate landing visibility differently, which must be considered in flying practice. It also should be borne in mind that cockpit view conditions, which are dissimilar for aircraft of different types, as well as the glass transparency during precipitation are of importance for determining landing visibility.

Like the lower cloud boundary, landing visibility can change often, especially when clouds descend and precipitation increases or decreases. Therefore in weather minimums we should continuously observe the clouds and visibility.

The following must be taken into account in meteorological support of aircraft and helicopter flight safety in weather minimums. With a cloud height of around 100 m the runway detection level is at a height of around 50-70 m from the Earth's surface, and the landing visibility value averages less than 50 percent of ground visibility range. Greatest deviations between landing and ground visibility values are seen in the presence of drizzle and snow.

If the lower cloud boundary is within the limits of 100-200 m, the ground object detection level rises and landing visibility increases, being 50 percent of ground visibility for helicopters, 30 percent for supersonic aircraft and 45 percent for transport aircraft. When clouds are above 400 m landing visibility approaches ground visibility.

It should be remembered that a decrease or increase in landing visibility depends to a considerable extent on features of the evolutionary condition of clouds (formation, break-up, rising, lowering). It is noted that landing visibility beneath a layer of rising or dispersing clouds is better than with compacting or lowering clouds.

It would appear that these recommendations will help meteorological specialists and flight personnel ensure flight safety.

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PSYCHOLOGICAL INTERACTION OF PILOT, CONTROLLER DISCUSSED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 3, Mar 87 (signed to press 2 Feb 87) pp 26-27

[Article by Col V. Smirnov, 1st Class military pilot, candidate of psychological sciences, under rubric "Flight and Psychology": "The Object of Control is in the Sky"]

[Text] The cadet was making the flight under weather conditions which he was encountering for the first time. The absence of a natural horizon because of haze caused a delay in retracting the landing gear after take-off, something the flight controller noticed. When the cadet was preparing to place the valve in a neutral position after retracting the landing gear he heard a query from the ground in his earphones:

"36, have you retracted landing gear?"

The answer immediately followed:

"36, retracted, neutral."

In fact, however, the valve remained in the "retracted" position. Subsequently in making the landing approach the cadet executed the customary landing gear movement with the valve by shifting it one notch lower. He was sure that the landing gear had been lowered but in fact he moved the valve from the "retracted" position to the "neutral" position. A slight deviation later made in the landing approach distracted his attention from warning indications.

A dangerous precondition for a flying accident thus arose which an observer prevented by promptly reporting to the flight controller that the aircraft was coming in with landing gear up. At first glance the pilot is wholly at fault here, but still, just what is his real blame? Psychological science is familiar with the phenomenon of substituting one action for another. The example illustrates it with all obviousness: instead of making a certain movement, the pilot limited himself to reporting it. This occurred because, by asking the cadet an unexpected question, the flight controller disturbed his existing stereotype of take-off actions. As a result, after performing the number of operations prescribed by instructions, the cadet had no doubt as to the correctness of what he had done. Thus it turned out that the flight

controller, who did not take account of the psychology of the pilot's activities in attempting to help him, also was an accomplice in this mistake by the cadet.

Just what are the psychological features of controlling crews in the air? Two principal figures function in any control process: the subject of control and the object of control. In our case this is the flight controller and the pilot. To ensure that the "flight controller-pilot" system functions reliably it is necessary to consider specific features and characteristics of the elements included in it. Basically the control system is studied from the standpoint of operator activities. Although such an approach is constructive, in aviation we cannot get by with it alone inasmuch as the flight controller (the subject of control) and the pilot (the object of control) are very specific elements. This specific nature is dictated by the fact that their psychology exerts a substantial (and often a decisive) influence on all operator qualities, and this must be taken into account in organizing flight operations. Without this it is impossible to improve the reliability and stability of control and consequently flight safety.

Just what are the basic psychological features of a pilot as an object of control? The primary factor in their formation is the nature of flying work: work separated from the ground, a constant strain on attention throughout the flight, a high forced rhythm of activity dictated by circumstances taking shape in the air, a considerable emotional background, and a need for constant inner readiness for surprises, danger and risk. All this together affects the pilot's intellect, psychology, character, behavior and acts.

In carrying out a flight he is participating in a "dual" control process. On the one hand, he estimates the situation, makes and executes decisions, and monitors and corrects his own actions (self-control), and on the other hand he executes the commands of the flight control group (outside control).

Pilots' self-control developed historically together with the development of aviation affairs. Up to a certain moment self-control was sufficient to regulate air traffic, but a need arose for controlling flights as a special kind of military aviation activity as aviation equipment became more complex, as air space became saturated with the aircraft of different departments, and as demands rose on the organization of air traffic. It was becoming more and more difficult for a pilot to make a proper decision in the enormous flow of information, and in this connection there was a sharp increase in stress, which degraded the capabilities of self-control.

For a pilot in a state of heightened stress there is a degradation in scope of attention, increased difficulty in distributing and shifting attention, a deterioration of working capacity, and a disturbance of memory and perception--he forgets the sequence and procedure of actions or often arbitrarily focuses attention on individual objects.

Stress is what explains many pilot errors, particularly deviations from an established flight regime and inaccuracies, incompleteness and slips of the tongue in radio traffic. This is especially dangerous when a pilot loses confidence in his own abilities. In such cases the flight controller's role

is especially important. He must be able to determine the pilot's condition even from indirect signs and help him complete the flight safely.

Stress sharply degrades a person's capabilities for self-regulating his actions. Experience shows that some pilots, especially beginners, feel constrained due to an inability to form an integral idea of the air situation based on information contained in the radio exchange of crews in the air. Taking this psychological "flaw" into account, the experienced flight controller gives the fullest possible information about the situation in the flying area without fail, reinforces monitoring of the crew's work and issues commands extremely clearly.

It is very important to know the dynamics in which flying skills are formed and preserved. For example, deautomation sets in most often and most quickly with complex or insufficiently reinforced skills. Therefore it would appear that the flight controller must be especially attentive in following the actions of a pilot at those very moments when the pilot is performing elements recently mastered or difficult for him.

Psychologists have established that the structure of a cadet's flying skill changes after he performs several solo flights in a certain kind of flight training. Here there is a transition from copying an instructor's actions to developing one's own "signature" and the structure of the individual skill corresponding to it, as a result of which there is a temporary deterioration in flying quality. In this period the flight controller must be especially attentive in monitoring and assessing a pilot's behavior in flight and promote a most rapid reinforcement of an individually corrected skill.

Flight control is extraordinarily responsible and complex in a higher military aviation school for pilots. It is very difficult to predict the cadet's behavior in the first solo flights, where a person makes a quality "psychological leap": he remains one-on-one with the sky for the first time in his life. A new feeling arises of being separated from other people. This is why psychological support assumes special significance. Even a simple query by the flight controller as to how a cadet feels and a timely response to the cadet's report about progress in performing an assignment is of inestimable moral support.

The need for contact with the ground is considerably strengthened in a complicated situation. In such a case the pilot has to rapidly develop a correct plan of action and this very thing is greatly hampered by the complexity of flying and the additional stress. Only a well trained GRP [flight control group] can boldly assume responsibility for the most difficult factor--making the decision and producing an algorithm of actions. This is very important inasmuch as the solution to a special instance is implemented through the joint efforts of the flight control group and the pilot. This means constant readiness for surprises in the air is a necessary requirement both for the pilot and for all flight control group personnel.

The usefulness of stable skills in flying work is indisputable and generally recognized. Flights represent an area of strict regimentation which to a certain extent simplifies the difficult task of control. At the same time,

rigid regulation produces a certain stereotyped thinking in the pilot, especially in those phases of the flight such as the take-off, landing approach and landing. The generally beneficial stereotyping of thinking sometimes hampers going beyond the bounds of what is customary. For example, it is difficult for a pilot to immediately execute a command from the flight control group if it is not included in his plan of action even though he perceives it as mandatory. Therefore in issuing a "nonregulation" command the flight controller must be especially attentive in monitoring how correctly the pilot understood it and how he executed it.

An example was given at the beginning of the article in which the effect of psychological substitution operated. Conclusions can be drawn from an analysis of this phenomenon that under conditions of an information load the pilot monitors actions not only according to their content and the result achieved, but also according to the action itself (or its substitute) in the chain of events. A strong distracting factor requiring an immediate reaction (such as a report to the flight controller's query) can realistically substitute for the next operation of controlling the aircraft. In connection with this, flight control group members must take into account the great force of their influence on a pilot.

It is especially important to thoroughly understand the pilot's behavior in stress situations. An abrupt degradation of the ability to comprehend information content is one of the widespread manifestations of a pilot's psychology in such cases. Another variant is a concentration of attention on some one thing. We will show this in an example.

During an LTU [tactical flying exercise] Capt A. Savelyev, who had accomplished a night intercept in the stratosphere, discovered that his fuel remainder was close to the emergency level. The flowmeter literally riveted attention to itself. Concentrating on strictly maintaining an economic power setting for the descent, Savelyev performed superficial orientation, constantly returning to monitoring the fuel remainder and the power setting. Therefore he identified the very first marker light with a light heart as the landing area. He began constructing a landing maneuver without analyzing the navigation data. He lowered the landing gear and flaps and increased engine rpm. Only at the last moment did the pilot notice that he had incorrectly determined the airfield's position. Now, already with the "emergency remainder" light burning, he again had to structure his landing approach. Everything ended safely if one does not take into account that, as a check measurement showed, some 50 liters of fuel remained in the tanks after taxiing. This is what concentration of attention on one object means.

And one other psychological point which people connected with flight control must know. A pilot's overall excited state in the air increases his receptivity to all kinds of information. On the whole this is good, but there is also a negative side to this: a pilot easily picks up not only the semantic meaning of commands from the flight control group, but also their psychological coloration. Nervousness and irritability are transmitted instantaneously.

Sr Lt L. Makarov was coming in for a landing after a flight to maximum range. Based on reports of crews proceeding ahead of him and from flight control group information the pilot formed the impression that the weather situation in the airfield area was simple. By the time the aircraft approached the calculated turn weather conditions had deteriorated, but permitted coming in for a landing without particular difficulty. The flight controller radioed a command about a change in the procedure for the crews' landing approach. Irritation was picked up in his voice at this time which at the given moment was caused by circumstances having nothing to do with the flights at all or with Makarov's approach in particular. The flight controller's nervousness was "interpreted" as evidence of a significant worsening of weather over the airfield and this caused Makarov's uncertainty. He executed the landing approach with great deviations and a second circle became inevitable.

Such important factors as the objective, motives, methods and results are part of the pilot's psychological structure of activities. Objectives and motives are the controllable parameters in the flight control process. While the objective is a category which shows up clearly, the motive is not identified so simply. Why for example does a pilot try to make a good landing? The answer would seem to be obvious--professional interest in improving flying techniques and safety considerations. Studies, however, indicate that some pilots very much do not wish to receive criticism from the controller for a poor landing or to be in their comrades' circle of criticism. In essence we are dealing with a negative motivation which has an undesirable future--it engenders "nonworking" emotions which in the final account degrades the flying technique. Therefore the flight controller must study very carefully right on the ground the psychological make-up of pilots whom he is to control. On discovering some unfavorable factor he must find ways of immediately overcoming it.

And so a pilot's psychological qualities and his personality characteristics as an object of control determine the specifics of the flight control group's control activities on behalf of the principal factor--quality performance of every assignment.

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ROSTER, ACCEPTANCE CONDITIONS OF AIR FORCES MILITARY SCHOOLS

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 3, Mar 87 (signed to press 2 Feb 87) pp 28-29

[Article: "Air Forces Higher Educational Institutions Give an Invitation"]

[Text] Air Forces schools are accepting warrant officers [praporshchiki and michmany] on active military duty in the USSR Armed Forces, first-term and extended-term servicemen, military construction personnel, civilian youth, reservists who have served a period of active military duty, and graduates of Suvorov military and Nakhimov naval schools with a secondary education. Warrant officers are not accepted in military aviation-technical schools.

Professional selection of candidates is made by a comprehensive evaluation of the individual in the following areas: sociopolitical activeness and moral qualities, state of health with consideration of psychological data, physical fitness, and general educational level. The acceptance commission draws a conclusion as to the advisability of enrolling a candidate in school based on a comprehensive evaluation of all professional selection indicators.

The age of warrant officers, extended-term personnel who have served at least two years as of 1 September of the entry year, as well as reservists released to the reserve must not be over 23 years, and that of first-term servicemen, military construction personnel, graduates of Suvorov military and Nakhimov naval schools and civilian youth must be not over 21. Candidates from the civilian youth must be no younger than 17 as of 31 December of the entry year.

Servicemen wishing to enter school submit an application through channels to the military unit commander prior to 1 May of the entry year. In it they give their military rank, full name, position held, year and month of birth, education, and the name of the chosen school. Appended to the request is an autobiography, official and party (Komsomol) performance appraisal, record of service card, copies of a secondary education document and birth certificate, and three certified photographs (without headgear, 4.5x6 cm in size).

Civilian youths submit a request to the rayon (city) military commissariat at their place of residence or directly to the chief of the military educational institution before 1 June of the current year. The request gives their full name, year and month of birth, address of residence, and the name of the school which the candidate wishes to enter (regardless of whether or not the

given military commissariat has an allocation for this higher educational institution). Appended to the request is an autobiography, performance appraisal from place of work or study, party (Komsomol) performance appraisal, notarized copies of a secondary education document (pupils of secondary schools, tekhnikums and PTU [vocational-technical schools] submit information on their current progress) and birth certificate, and three certified photographs (less headgear, 4.5x6 cm in size).

Candidates submit a passport, record of service or registration certificate, original secondary education documents and a birth certificate to the acceptance commission on arrival in school.

CPSU members and candidate members and Komsomol members must have the appropriate party or Komsomol document with them.

Civilian youths take entrance exams and undergo a check in all professional selection areas directly at the schools. Servicemen undergo professional selection and take entrance exams before traveling acceptance commissions, usually at training course locations in groups of forces and military districts. Candidates who have arrived in school for the period of professional selection are provided with a dormitory and free meals according to the norms of first-term service soldiers.

Entrance exams to higher military aviation engineering, flight and navigation schools are held within the scope of programs of secondary schools of general education in Russian language and literature (written), and in mathematics, physics and USSR history (verbal).

Exams are given in secondary military aviation-technical schools in Russian language and literature (written) and in mathematics (verbal). In a number of schools exams are given and their results processed using computers.

The candidates' physical fitness is checked to the extent of demands of individual norms of the USSR GTO [Ready for Labor and Defense] Complex and the military sports complex (100 m dash, pull-up or felge on the horizontal bar, 3,000 m crosscountry race, and swimming).

All matriculants undergo a check under special methodologies using tests and equipment permitting a determination of their psychophysiological abilities and mastery of a chosen specialty. Entry preference is given to candidates with higher psychophysiological indicators.

School professional selection acceptance commissions work during the period from 10 through 30 July.

The following are enrolled in military aviation-technical schools without a check of knowledge in general education subjects but with conformity to all other requirements of professional selection (sociopolitical activeness and moral qualities, state of health with consideration of psychological data, physical fitness), and those with Group 1 psychological data also in schools for pilots and navigators: Heroes of the Soviet Union and Heroes of Socialist Labor, persons awarded USSR orders and medals for distinction in combat

actions in defense of the USSR and in performance of international duty, graduates of Suvorov military and Nakhimov naval schools, and persons who have completed secondary specialized educational institutions with an honors diploma or secondary schools with a gold (silver) medal.

On entering higher aviation schools persons awarded a gold (silver) medal on completion of secondary school or who completed a secondary specialized educational institution with an honors diploma (except for candidates entering schools for pilots and navigators and having Group 1 professional psychophysiological data) take only one exam in a discipline determined by the chief of the higher educational institution. On passing the exam with a grade of outstanding they are relieved of further exams, but on receiving grades of "good" or "satisfactory" they also take exams in the other disciplines.

Students who have completed the first or subsequent courses of civilian higher educational institutions in specialties corresponding to the profile of the given military school and who have gone through an interview may be enrolled without a check of knowledge in general education subjects but with conformity to all other professional selection indicators for the first course of higher or secondary military aviation schools. If they do not conform to the profile of the higher educational institution these candidates take exams on a universal basis. The acceptance commission chairman makes the decision for an interview or exams.

Servicemen who have displayed high moral-combat qualities in defense of the USSR and in performance of international duty, servicemen of first-term and extended-term service who are outstanding in combat and political training and announced as such in a military unit order, as well as first-term servicemen entering military aviation-technical schools are accepted into higher military aviation schools hors concours based on professional selection results on receiving positive grades in general education subjects. The proposal for hors concours acceptance is made by professional selection commissions in districts and groups of forces, which is indicated in the selection cards.

Warrant officers with work experience in the specialty or profile of the school as well as servicemen who are rated specialists, candidates from among workers and kolkhoz members with a work period of at least one year, as well as young people sent to study on Komsomol orders issued by political departments and rayon and city committees of the Komsomol, and candidates with higher professional psychological selection indicators enjoy a preference in entering military aviation schools when professional selection indicators are equal.

The period of training in aviation schools for pilots and navigators is four years, in engineering schools five years and in technical schools three years. Military school cadets are provided all allowances. They are granted a two-week vacation and a month's leave annually during their time of training. Those completing school are given the military rank of lieutenant and are issued an all-union diploma with conferral of the appropriate qualification and badge.

The following announce acceptance of cadets for the first course:

Kacha Order of Lenin, Red Banner Higher Military Aviation School for Pilots imeni A. F. Myasnikov (400010, Volgograd, 10).

Chernigov Higher Military Aviation School for Pilots imeni Leninist Komsomol (250003, Chernigov, 3).

Kharkov Order of Red Star Higher Military Aviation School for Pilots imeni Twice-Honored HSU S. I. Gritsevets (310028, Kharkov, 28).

Borisoglebsk Order of Lenin, Red Banner Higher Military Aviation School for Pilots imeni V. P. Chkalov (397140, Borisoglebsk, 2, Voronezh Oblast).

Barnaul Higher Military Aviation School for Pilots imeni Chief Mar Avn K. A. Vershinin (656018, Barnaul, 18).

Tambov Higher Military Aviation School for Pilots imeni M. M. Raskova (392004, Tambov, 4).

Orenburg Red Banner Higher Military Aviation School for Pilots imeni I. S. Polbin (460014, Orenburg, 14).

Balashov Higher Military Aviation School for Pilots imeni Chief Mar Avn A. A. Novikov (412340, Balashov, 3, Saratov Oblast).

Syzran Higher Military Aviation School for Pilots imeni 60th Anniversary of the USSR (446007, Syzran, 7, Kuybyshev Oblast).

Saratov Higher Military Aviation School for Pilots (410601, Saratov, 1).

Ufa Higher Military Aviation School for Pilots (450016, Ufa, 16, Bashkir ASSR).

Voroshilovgrad Higher Military Aviation School for Navigators imeni Donbass Proletariat (348004, Voroshilovgrad, 4).

Chelyabinsk Red Banner Higher Military Aviation School for Navigators imeni 50th Anniversary of the Komsomol (454015, Chelyabinsk, 15).

Voronezh Higher Military Aviation Engineering School (394064, Voronezh, 64).

Kharkov Higher Military Aviation School of Radio Electronics imeni Leninist Komsomol of the Ukraine (310165, Kharkov, 165).

Irkutsk Order of Red Star Higher Military Aviation Engineering School imeni 50th Anniversary of the Komsomol (664036, Irkutsk, 36).

Tambov Order of Lenin, Red Banner Higher Military Aviation Engineering School imeni F. E. Dzerzhinskiy (392006, Tambov, 6).

Kharkov Red Banner Higher Military Aviation Engineering School (310048, Kharkov, 48).

Achinsk Military Aviation-Technical School imeni 60th Anniversary of the Komsomol (662100, Achinsk, 1, Krasnoyarsk Kray).

Vasilkov Military Aviation-Technical School imeni 50th Anniversary of the Leninist Komsomol of the Ukraine (255130, Vasilkov, 3, Kiev Oblast).

Kaliningrad Military Aviation-Technical School (236044, Kaliningrad, 44, Kaliningrad Oblast).

Kirov Military Aviation-Technical School (610041, Kirov, 41, Kirov Oblast).

Lomonosov Military Aviation-Technical School (188450, Lomonosov, Lebyazhye Settlement, Leningrad Oblast).

Perm Military Aviation-Technical School imeni Leninist Komsomol (614049, Perm, 49).

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STEPS FOR PREVENTION, DETECTION OF TURBOPROP ENGINE OVERHEATING

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 3, Mar 87 (signed to press 2 Feb 87) pp 29-30

[Article by Lt Col V. Zavyalov under rubric "Advice to the Technician": "Don't Permit Engine Overheating"]

[Text] There are instances in flying practice where an engine must be removed prematurely because of its overheating. Most often the reasons for this are very gross errors by specialists operating the aviation equipment. To prevent engine overheating one must have a good knowledge of and precisely fulfill basic requirements of the instructions for operating and maintaining the TVD [turboprop engine].

One of the primary parameters of turboprop engine operation which must be monitored constantly is maximum permissible turbine outlet temperature during start-up and in flight. The AI-20M engines are especially sensitive to that temperature being exceeded. An increase in their output was achieved to a certain extent by introducing a new design solution, including an increase in turbine grid density. For this reason turbine moving blades react more acutely to a temperature increase than do those of previous series of this make of turboprop engine. Flight and engineering-technical personnel operating the AI-20M engines must know that even slightly exceeding the permissible limit of turbine outlet temperature can lead to their overheating. Turbine moving blades may partially fuse or scorch in so doing, with the extent of their damage depending on the duration of the effect and temperature of the gases.

Another feature of operating turboprop engines is the limitation of maximum turbine outlet temperature as a function of ambient air temperature. Specialists unfortunately give it insufficient attention in the majority of cases: sometimes they are oriented only on basic technical data of maximum permissible turbine outlet temperature values given for standard atmospheric conditions and do not attach proper importance to entries about the correction of gas temperature depending on flight conditions, i.e., on ambient temperature.

Therefore it may turn out that AI-20 engines will operate for a lengthy time at a higher temperature without an adjustment being made. This can entail a degradation of blade strength properties.

It is also important for aviation specialists to remember something else: with a deviation of ambient temperature from standard atmospheric conditions, for each ±1° the maximum permissible gas temperature also changes by ±1°. For example, in a flight at engine cruising power setting at an altitude of up to 8,000 m with an ambient temperature of -10° maximum permissible turbine outlet temperature must be 25° below the value given in the instruction.

In case permissible turbine outlet temperature is exceeded in flight, flight personnel must change the engine power setting. After the aircraft lands there must be a careful inspection of all engine assemblies and components using instrumental means of inspection and a comprehensive analysis of the operation of its systems and machine units (compressor, automatic fuel equipment and so on), and only after this is a decision made about the further fate of the power unit.

The experience of turboprop engine operation as well as statistical data indicate that noncompliance with basic requirements of the operation and maintenance instruction is connected most often with inattentiveness of flight personnel, who make errors in starting up and testing an engine: late pressing of the fuel cut-off button when there is an intense increase in turbine outlet temperature, which leads to the temperature shooting above maximum permissible values; and insufficient monitoring of instruments tracking the operation of an engine being started up. Such errors are typical of flight personnel with slight experience in turboprop engine operation.

It is also possible to exceed turbine outlet temperature in checking the working capacity of the propeller control system. For example, engine rotor rpm drops when reducing engine power setting to idle due to late removal of the propeller "from the intermediate stop." Since outputs developed by the turbine here are insufficient for rotating the compressor and propeller, turbine outlet temperature rises, which may lead to surging.

After each instance of turbine outlet temperature being exceeded it is necessary to carefully inspect engine assemblies and components, ensuring that no outside noise appears when turning over the engine rotor using the propeller.

A visual inspection of turbine blades provides a great deal, although not all its stages can be seen. It is common knowledge that stage discs are situated one after the other here along the longitudinal engine axis and only blades of the turbine third stage are visible from the exhaust nozzle. One can judge the serviceability of the other stages, however, according to the condition of the third stage. Traces--metal which has adhered and which is easily seen or felt--remain on the rear turbine rotor with fusion or other damage to forward rotor blades. A floodlight should be used to facilitate blade inspection. Specialists inspect the jet nozzle and exhaust pipe at the same time as they check the turbine's condition, since their deformation and crack formation is possible with engine overheating.

Flight and engineering-technical personnel must constantly monitor gas temperature to preclude cases of turboprop engine overheating. Special

attention should be given to the physical essence of phenomena which are occurring. Subunit IAS [aviation engineering service] heads must regularly arrange training for the record on features of starting up and operating turboprop engines. These measures will permit operating the turboprop engine more competently and avoiding cases of premature engine removal.

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DOSAAF HISTORY, PRESENT DIRECTIONS DISCUSSED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 3, Mar 87 (signed to press 2 Feb 87) pp 32-33

[Article by Col Gen Avn S. Kharlamov, deputy chairman of USSR DOSAAF Central Committee, HSU, Honored Military Pilot USSR, under rubric "Toward the 70th Anniversary of the Great October": "Double-Order Defense Society"]

[Text] The All-Union Volunteer Society for Cooperation with the Army, Aviation and Navy is 60 years old, and today Soviet citizens automatically turn to its history from the height of what it has accomplished. A mass defense movement unfolded in our country soon after the establishment of Soviet power. While carrying out a military reform and numerically reducing the Red Army in the 1920's, the party and government were concerned with reliably ensuring the inviolability of the Motherland's sacred borders. Volunteer patriotic defense organizations taught military affairs to workers who were not on military duty in that period. One of the first such organizations was the Military Scientific Society, established in 1920 with the objective of propagandizing military knowledge. Six years later it was renamed the Society for Cooperation with Defense of the USSR (OSO). The Society of Friends of the Air Fleet appeared in 1923 and a year later came the Society of Friends of Chemical Defense and the Chemical Industry. They merged in the spring of 1925 into the Society of Friends of Aviation and Chemical Defense and Industry (Aviakhim). These societies did a great deal to implement Leninist ideas about broad inclusion of popular masses in strengthening USSR defense.

Sixty years ago a resolution was adopted at a joint session of delegates of the All-Union Congress of Aviakhim and participants of the OSO Plenum establishing the Union of Societies of Friends of Defense and Aviation-Chemical Construction of the USSR. Thus arose a single mass defense volunteer organization of workers, Osoaviakhim, which in 1951 began to be called USSR DOSAAF. This is one of our country's largest and most influential public organizations. Its patriotic work serves as convincing affirmation of the correctness of the party line for preparing worthy replacements for our glorious Armed Forces, involving broad masses of workers in military-technical training, and strengthening the unity of the Army and people.

Decoration of the USSR DOSAAF with the orders of Lenin and Red Banner was national recognition of its services to the Motherland. Today it is rightly

called a school of patriots and a reliable reserve of the Soviet Armed Forces. The Defense Society takes an active part in developing Soviet aviation and in training and indoctrinating those who become its pride. The origins of this work go far back into the 1920's. Considering the need for developing the Red Air Fleet, it was then that the party Central Committee and Soviet government took decisive steps to resurrect aviation plants from the ruins. Considerable funds were allocated for these purposes. The party's call "Working people, build the Air Fleet!" was received with enthusiasm by millions of Soviet citizens. A mass volunteer organization, the Society of Friends of the Air Fleet, actively implemented this party call, took an energetic part in training pilots and glider pilots, and together with Komsomol organizations selected and sent Komsomol members to aviation schools.

The Society played a major role in designing aircraft and creating domestic aircraft engines; it began the development of aviation sports in the country, above all glider sport and aircraft model building. The first all-union glider competitions in the Crimea in November 1923, which later began to be held regularly, were an important beginning.

The call "From the model to the glider, from the glider to the aircraft" found a broad response in the country, and the proficiency of Soviet glider pilots grew. The most experienced of them--P. Golovin, S. Anokhin, N. Simonov, I. Sukhomlin and V. Lisitsyn--made outstanding endurance flights. The majority of glider pilots linked their lives with aviation forever.

In the 1930's the Communist Party assigned leadership in development of mass parachutism to the Komsomol and Osoaviakhim. Construction of parachute towers unfolded throughout the country. Many young people who trained in Osoaviakhim joined the ranks of the Red Army's courageous airborne personnel. The wide development of parachutism served as the basis for indoctrinating a high class of parachute sportsmen. By the end of 1933 they had set world records for a delayed high-altitude jump without an oxygen set and N. Yevdokimov made a jump from an altitude of 8,100 m. He was in free fall for 142 seconds and opened the parachute only 200 m from the ground. This was a world record.

One direction of the Society's aviation work was active cooperation in creating domestic equipment for studying upper layers of the atmosphere. Osoaviakhim personnel also made their contribution to the development of dirigible construction in the USSR. Aeronauts P. Fedoseyenko, A. Vasenko and I. Usyskin performed their immortal exploit on 30 January 1930. In the stratostat Osoaviakhim-1 they reached what was for that time a record altitude of 22,000 m. The study of upper layers of the atmosphere created real preconditions for the assault on outer space. In the early 1930's a jet engine section was created under the Central Council of the Defense Society and later the Central Group for Jet Propulsion Study (TsGIRD) was created, headed by engineer and inventor F. Tsander.

The popular slogan proclaimed by the 9th Komsomol Congress "Komsomol member to your aircraft!" found a most fervent response among Soviet youth. The country's youth gave all possible assistance to the Defense Society in building air clubs and airfields, fabricating training aids and locating the funds needed for acquiring aviation equipment. The USSR Central Air Club was

opened in 1935 with the Komsomol's active participation. Using the already existing experience in training pilots from among the working youth without separation from production, the Defense Society began establishing air clubs. Transition to such a system of training aviation cadres without separation from production contributed to an increase in the number of those who trained in flying. The successful work of air clubs attested to their wide capabilities in carrying out basic training of pilots of the Air Forces [Air Forces] and GVF [Civil Air Fleet]. In 1938 Air Forces schools shifted to obtaining their cadets exclusively from young people who had undergone training in air clubs.

The Society's extensive work in aviation's comprehensive development produced positive results, as shown by the fact that from 1930 through 1941 over 120,000 pilots, 122,000 parachutists and 27,000 glider pilots were trained in air clubs.

Society alumni wrote glorious pages in Great Patriotic War history. The Defense Society is proud of the fact that 950 of the 2,785 military pilots who received the HSU title took basic training in air clubs. Such wonderful pilots as Triple HSU's A. Pokryshkin and I. Kozhedub and Twice-Honored HSU's A. Alelyukhin, P. Golovachev, D. Glinka, Ye. Kungurtsev, V. Lavrinenkov, A. Molodchiy, P. Pokryshev, B. Safonov and P. Taran emerged from them.

Many Defense Society alumni fought the enemy bravely. For example, well-known Soviet glider pilots S. Anokhin, G. Malinovskiy, V. Vygonov, I. Borisov and others took assault gliders into the enemy rear to the partisans. Many later transferred to the cockpits of combat aircraft and defeated the fascists in the air and on the ground.

After the end of the Great Patriotic War new tasks which conformed to new requirements arose for the Defense Society. In this period the structure of defense organizations was improving and the scope and quality of military-patriotic, mass defense, training and sports work was increasing. Aviation organizations also underwent radical changes and their physical facilities improved.

Fulfilling directions of the CPSU Central Committee and USSR Council of Ministers, a Defense Society aviation organization unfolded extensive work under the direction of local party and soviet organs to prepare the youth for service in our Armed Forces. There has been a significant increase in the proficiency of aviators who are DOSAAF alumni in recent years. Our pilots, parachutists and aircraft model builders successfully perform in world championships. Many record achievements in the world arena belong to USSR DOSAAF pilots.

Such renowned aces of sports aviation as V. Martemyanov, G. Korchuganova, I. Yegorov, S. Savitskaya, L. Leonova, V. Letsko, V. Smolin, V. Yaikova and Kh. Makagonova became all-around champions in aircraft sport in world and European championships.

A total of 539 medals have been won in the international arena in the history of aviation sport in the USSR, of which 193 were gold, 181 silver and 165 bronze.

Parachute sport also holds one of the leading places in our country. Since 1935 Soviet parachutists have set 960 all-union records, of which 754 exceed world achievements. The Soviet parachute school is the world's leading school. Our sportsmen took part for the first time in the 11th World Championship in France in 1954 and won a victory in team results. At that time I. Fedchishin, a sportsman from Dnepropetrovsk, became all-around champion. Since then our parachutists usually have taken prizewinning places in international competitions and world championships. In the last two world championships in France (1984) and Turkey (1986), the Soviet Union's men's and women's teams won the title of world champions. Among parachutists who are world record holders are honored masters of sport of the USSR Valentina Zakoretskaya with some 10,000 jumps and Anatoliy Osipov and Yuriy Baranov with some 13,000 jumps. Among the credits of Soviet sportsmen are unique jumps into the Pamir and onto the Kommunizm and Lenin peaks and the top of Elbrus. DOSAAF parachutists took part in the EKSPARK-84 and EKSPARK-86 experiments by making group jumps onto drifting ice floes near the North Pole for the first time in the world.

Glider sport saw further development in the postwar period. Our sportsmen confidently continued the count of world and all-union achievements. World records were set by V. Pavlov, A. Samosadov, V. Simonov and V. Ilchenko.

It is common knowledge that in the first years the sports use of helicopters was limited to demonstrating the surprising features of these craft at air festivals. The first Ka-8 helicopter with a coaxial arrangement was demonstrated at a parade in Tushino in 1948.

The year 1958, when the first all-union competitions were held in Kaluga, is customarily considered the year when development of mass helicopter sport began in the USSR.

Soviet helicopter sportsmen took part in four world championships and invariably achieved high results both in team and individual results. They set 48 world records.

Aircraft model building also is one of the most popular forms of sport. Activities in this sport actively help accustom the youth to technical creativeness and help bring up patriots and defenders of the socialist Motherland.

Preparation of the youth for service in the Armed Forces has been and remains an important state assignment of the Defense Society. Fulfilling it at the level of demands of the 27th CPSU Congress means persistently striving to further improve work with future servicemen in the system of basic military training of draftees and instilling in the youth a sense of historical responsibility for the Motherland's destiny and achievements of socialism, and constant political vigilance. Much is being done in this respect in DOSAAF where, with a good physical facility, specialists--drivers, radio operators, parachutists, divers--are being trained for our Army and Navy and applied military sports are being developed. DOSAAF organizations also perform much work to prepare young people for entry into military aviation schools. For example, at the present time groups of pupils from schools of general

education have been formed in aviation sports clubs (ASK) for basic flight training of young people in the ages of 16-17. This contributes to the young people's professional orientation and provides initial flying skills to those entering Air Forces higher educational institutions. As shown by the first graduations, a considerable number of young people who completed aviation sports clubs have entered and are successfully training in higher military aviation schools.

In addition to basic flight training in aviation sports club groups, DOSAAF aviation organizations perform extensive work in preparing the youth for service in the USSR Armed Forces in schools for young glider pilots, parachutists, pilots and cosmonauts.

The Defense Society's work assumes special significance in light of 27th CPSU Congress resolutions. In fulfilling party requirements, DOSAAF organizations see their task as instilling in the youth with even greater persistence a love for the Motherland and constant readiness for her capable and staunch defense.

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DEVELOPMENT OF SOVIET AERIAL COMBAT IN 1930'S

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 3, Mar 87 (signed to press 2 Feb 87) pp 34-35

[Conclusion of article by Col Yu. Kislyakov, 1st Class military pilot, and Col (Res) V. Babich, candidate of military sciences, under rubric "Tactics and Simulation": "Development of Aerial Combat: Experience of the 1930's"]

[Text] Just what changes did aerial combat of the 1930's undergo in comparison with combat in the World War I and Civil War period? What did our volunteer pilots who fought in the sky of Spain, China and Mongolia leave as a heritage for the next generation of fighter pilots?

Despite an improvement in fighter aircraft, aerial combat remained close and maneuverable. The definition of "close" means it is conducted within visual range between enemies. The range of visual detection of an airborne target still greatly exceeded the range of effective fire of on-board weapons. Therefore all phases of combat fit within the space monitored by the pilot's vision.

Maneuvering in combat was a means of taking the aircraft into the limited area of weapon employment, which moved behind the enemy aircraft. The defender would attempt to reduce this area by abrupt changes in the flight direction, while the attacker tried to get "on the tail" of the evading enemy at a distance of from 200 to 50 m. The already familiar "carousels" appeared as a result of intensive maneuvering in the air. Existing on-board weapons did not yet have a decisive effect on the content of combat techniques or on the nature of individual combat. There was an expansion only in its spatial scope because of an increase in speeds and consequently in the radii of aircraft maneuvers.

Something new in the traditional scheme of combat appeared chiefly in the fact that it became group combat. This was already an armed clash of large groups of aircraft in the air, the outcome of which, in addition to individual qualities of the combat participants, began to be affected by factors unknown up until that time. The pilot became a member of a group of like-minded fighters having its own rules and laws. For example, attempts to arbitrarily leave formation even to attack a detected enemy were regarded as an infraction of the law. Aces had a difficult time becoming accustomed to the new rules, but even knightly qualities often did not permit fighting a group alone

successfully. The flimsy threads of interaction broke immediately with weak control of a group which had to reform quickly and change the direction of attack at the commander's will.

As it was 20 years before, in controlling the group the commander would give a cautionary command ("I see the enemy," "Prepare for attack") and a command of execution ("All attack") by evolutions of his aircraft and would set a personal example. The formation would break up after an attack by the group and individual clashes would be continued by flights, or more often by pairs and lone aircraft. Centralized control essentially ended after the opposing groups "infiltrated" each other. The value of the first group attack increased under these conditions. The more effective it was, the greater the damage inflicted on the enemy and the easier it was to destroy those deprived of support. The commander's art in controlling a group in combat lay in choice of the decision: a simultaneous attack in several directions or a concentrated attack in one direction. A more complex variant to execute was when a feint attack was made in a secondary sector and a camouflaged attack group would be committed in the main direction. As before, concealment was aided by clouds, the sun, and the dark side of the sky at twilight. Usually the one who detected the enemy first seized the initiative. Surprise compensated for the enemy's advantage in numbers, and often also decided the outcome of group combat. Its role in tactics was paramount.

The simplest means and methods of control came into conflict with complex methods of combat actions by fighters. The reliability of a screen of patrols covering friendly troops depended on dispersal by altitudes, but flights of the upper and lower moving tiers often lost sight of each other. Aircraft detected in the distance would be taken as enemy aircraft, and fighters would leave their own zone to close with them. The accepted method of two-echelon alinement (at an altitude of 500 m against ground attack aircraft and 3,000 m against bombers) for commitment to repel an attack was no longer considered optimum.

Support for bombers also had weak points: the separateness of flanking escort and trailing escort flights affected reliability in protecting the attack group. The problem of cover and escort also was aggravated by a lack of aircraft. The shortage of forces could not be made up by maximum intensity of combat work (a term of the 1930's).

Nevertheless in a difficult combat situation our internationalist pilots successfully accomplished their assigned missions. For example, in 25 out of 50 mass fascist air raids on Madrid from November 1936 through April 1937 republican fighters did not let bombers through to the city. Pilots were left with only one minute for attack from the final and only commitment line with the limited ranges for detecting the enemy (the front line ran nearby). The importance of this minute was difficult to overestimate. Physical and moral efforts were required, and our people gave their utmost.

Some two years separate the final combat in the sky of China and the first aerial combat of the Great Patriotic War. Our volunteer pilots of the 1930's left very valuable combat experience for the Motherland's defenders of 1941, which consisted of the following.

The practical foundations of combat by flights and squadrons were laid down before the war in accordance with the fighter employment principle which had taken shape--by a simultaneous or successive concentration of efforts on the axis of main attack. The example of one of the participants of fighting in Spain is not without interest in this regard. From high up our pilots saw how tankers constantly changed positions to break open the situation in some one sector of the Madrid defense and create the appearance of a large massed force. Pilots emulated the tankers, the only difference being that they were forced to do this by the enemy, whose aircraft would come from different directions in an unending stream.

Hundreds of aircraft simultaneously participated in battles over the Khalkhin-Gol. In one action a pilot both would encounter covering fighters and would attack bombers. To do this he had to possess a large store of tactical procedures and combat maneuvers and use them depending on the air situation.

The merits and deficiencies of combat formations developed in peacetime were tested. A flight of fighters at that time consisted of three aircraft, with the two wingmen on either side and to the rear of the commander (vee), or extending to one side (echelon). The wingmen reliably protected the leader and had an opportunity of building up his efforts in an attack, but maneuvering of three aircraft was hampered, especially with abrupt evolutions. Therefore one wingman often separated from formation. At the end of the war in Spain fascist pilots were employing the following technique: several Messerschmitts would not enter into group combat after it began, but would take up a waiting position above and toward the sun. As soon as lone aircraft which had not held formation appeared they would pounce on them from above (Japanese fighters employed a similar technique). Thus the question of the primary tactical unit of a combat formation remained open.

The commander's role was defined as the organizer of group combat and creator of the tactical concept, and he also bore responsibility for its execution. The group leader's rights and duties were precisely defined. Here is how a subordinate of P. Rychagov characterized his commander: "Many were able to fly superbly and they fought excellently, but far from everyone could be a leader. What Rychagov did in combat could not be explained--it was an element in which the natural talent given him opened up. He was able to determine the only moment when an attack should be made, he chose the direction of the attack at the enemy's most vulnerable spot, and he combined the leader's capabilities with the high proficiency of a rank-and-file fighting man; this is shown by the 20 aircraft he shot down personally."

The first experience was received in night aerial combat. By its nature, night combat differed sharply from daytime combat and demanded special qualities of a pilot: precision in instrument flying, skills in spatial orientation with the natural horizon not visible, and the ability to locate the enemy in a dark sky and employ unique attack methods; and all this without the now customary ground controlled intercept and in the absence of radio communications. The pioneers of night aerial combat who shot down enemy aircraft in pitch darkness opened up the history of the present-day all-weather fighters.

The value and advisability of using combat experience which had not become obsolete has been proven. For example, in 1920 A. Shirinkin, commander of a squadron of Red fighters, shot down three enemy aircraft by using a new method of ground ambushes for the first time in the history of aerial combat.

In Spain Corps Commander Ya. Smushkevich, chief Air Forces adviser, proposed organizing small ambush airfields near enemy positions and air routes. The idea was successfully implemented; thanks to this, the time for closing with the enemy was reduced and the influence of the surprise factor was strengthened. Thus all basic methods of fighter combat actions were tested in action and their merits and deficiencies were identified: cover (patrolling), escort of attack forces, and ambushes on the ground and in the air.

Our pilots added to the experience of conducting combat when in the minority, with the enemy having a great numerical superiority. This came in especially handy in the initial period of the Great Patriotic War. The internationalist pilots proved once again that under such conditions fighter tactics consist not only of competent defense, but also chiefly of a bold attack at a convenient moment.

A combat formation consisting of a large number of fighters began to be divided into groups with a varying tactical purpose. Most often these were an attack group, holding group and reserve group, which received greatest freedom of action. That distribution was considered tentative within the squadron framework; on the other hand it was clearly manifested in the regimental combat formation. The distribution of roles took account of the combat capabilities of different types of aircraft in the squadrons' inventory. For example, the gun-firing I-16P which appeared in Mongolia would be included in the attack group in forming the combat formation. The highly maneuverable I-15's usually were used in the holding group.

Bomber defense tactics in aerial combat were substantially enriched. The specific nature of this defense was dictated by the aircraft's attack mission. Methods of collective defense, methods of realining the combat formation in anticipation of and during combat, fire coordination in the group, and evasive actions against fighters were established.

Planning of combat assumed very great importance in the absence of radio communications when combat actions were conducted by large groups. The plan would be elaborated with consideration of available experience and on the basis of a detailed prediction of enemy actions. The plan would be viewed as a guide for action. The group commander (pilot) would feel confident in having a preselected variant for allocating and committing forces, precise duties, and a coordination procedure. Implementation of the plan brought them closer to victory and precluded gross errors.

A. Dushin, a participant of fighting in the China sky, wrote that the question of control in aerial combat was decided only at the flight level; communications in the squadron with signals given by the commander was unreliable. The important factor was a clear understanding reached on the ground.

And finally it was shown that the diversity and many-sided nature of aerial combat obligate every fighter pilot to be concerned with a growth in his own professional expertise and development of tactical thinking. Knowledge of the air enemy played a special role. Pilots would study not only performance characteristics of the aircraft which they had to encounter in combat, but also their weak points and vulnerable spots where it was recommended to direct fire. They would recall the enemy's habits, favorite techniques, and accepted schemes for distributing forces. They analyzed regulation provisions concerning aerial combat. Just the one line from a Japanese regulation "group combat consists of separate individual engagements" made it possible to draw conclusions relative to their own tactics.

In the opinion of Soviet aircraft designer A. S. Yakovlev, an important combat mission consisting of overtaking and destroying the enemy was omitted as a result of being carried away with good maneuverability as the primary quality of our fighters. Not just maneuverability, but also speed and powerful weapons were needed for this. It is common knowledge that equipment has a decisive influence on tactics. Tactics and the experience of employing aircraft and on-board weapons in turn affect the development of equipment. Thus, dividing fighters into maneuverable fighters and fast fighters no longer was justified. A fighter with the primary mission of destroying the enemy in aerial combat had to be highly maneuverable, fast, and well armed. Our designers were constantly accomplishing this task on the eve of and during the Great Patriotic War.

The generation of Soviet fighters of the 1930's reinforced and enriched tactical principles of the Soviet school of aerial combat: combat activeness, collectivism, imagination, and equality of maneuver and fire.

Enemy aircraft shot down can be considered a quantitative indicator of combat activeness, but not this alone. Not one instance was noted in combat where our pilots avoided a clash while in the minority. Activeness was based on high professional and moral-psychological preparation.

Twice-Honored HSU A. Vorozheykin, a participant of the fighting in Mongolia, writes: "During the fierce months of war on the Khalkin-Gol I came to know the joy of victory and the bitterness of failure. I realized that you won't go far just on desire, boldness, and hatred of the enemy. You need proficiency and will. These qualities come only from labor in combat and exercises."

Clear-cut offensive actions were imbued with a spirit of collectivism and a readiness to give a friend help at a critical moment of combat. There were instances where our pilots would evacuate downed countrymen from enemy territory in single-seat aircraft, ram enemy aircraft, and place themselves under fire in order to save a comrade's life. There are many wonderful exploits in our aviation history demonstrating the grandeur of Soviet citizens' spirit and their exceptional selflessness and patriotism.

The improvement in combat tactics lay in a creative search for unbeaten paths to victory. Fighting airmen developed new techniques based on a careful analysis of the enemy's professional training and the capabilities of enemy equipment. P. Rychagov, S. Gritsevets, G. Kravchenko and many of our other

aces were true innovators and bearers of nonstandard tactical ideas. They drew comrades after them by their personal example and fought daringly in any situation.

The ability to combine an artful maneuver with destructive fire reflected the high professional level of our fighting men and attested to the strict purposefulness of the Soviet flying school. The following example is indicative. Three famous Japanese aces were shot down by our rank-and-file fighter pilots, and not as a result of surprise attacks, but according to all rules of the art--by a successive build-up of the advantage in each combat phase.

The experience of fighter combat actions gained in the 1930's was used in developing the combat regulations of air arms in 1940.

6904
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PROGRAMMING LOOPS FOR MICROCALCULATORS

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 3, Mar 87 (signed to press 2 Feb 87) pp 36-37

[Article by Col A. Andreyev and Col V. Rubin under the rubric "The Pilot and Computers": "Loops on the Programmable Microcalculator"]

[Text] A need sometimes arises in solving applied military problems to repeat calculations with one and the same formulas many times but with different values. Such computing processes are called loop processes. It is specifically for these computations that the PMK [programmable microcalculator] provides repeat commands--the operators FL0, FL1, FL2, FL3--placed immediately after the program fragment to be repeated, i.e., the loop body. The number of repetitions is registered by the loop counter, and for this the required number of repetitions is loaded in one of the memory registers--P0, P1, P2 or P3.

The counter reading is automatically reduced by one when the next repetition of the loop body is executed. The loop computing process ceases when the counter reads zero. After this control transfers to the address following that of the last loop command.

Let us examine the organization of a loop in a program in more detail.

Let us assume that we must organize a loop computing process with a known number of loops. To this end we will enter the necessary number of repetitions in register P3. A diagram of a fragment of such a program is shown in Fig. 1, from which it is apparent that commands of the fragment to be repeated (the loop body) are executed in sequence up to operator FL3, then this operator begins to function: content of the third memory register (P3) automatically is reduced by one, after which it is tested for equalling zero. If the content of the third register (loop counter) does not equal zero (register P3≠0), then control transfers to the address entered immediately after operator FL3, i.e., to the beginning of the loop. The process repeats until the content of the register-loop counter equals zero (register P3=0). Then control transfers to the address following the loop transfer operator.

We will note that the action of operator FL3 does not alter the content of register X, which permits using the result in this register for computations in a subsequent loop. In addition, everything said about operator FL3 fully

relates to each of the operators FL0, FL1 and FL2 which use registers P0, P1 and P2 respectively as loop counters.

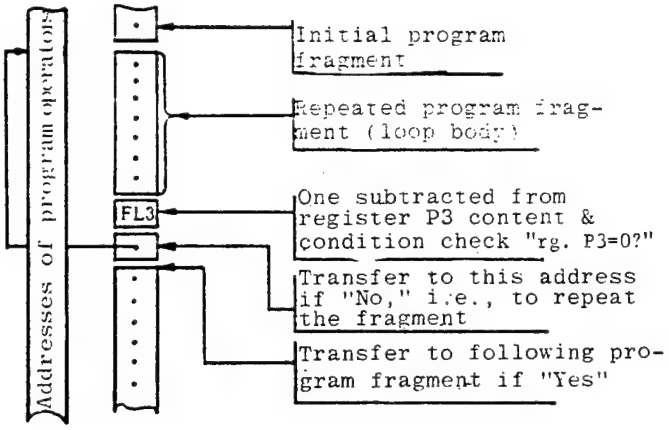

Fig. 1

With an unknown number of repetitions the loop counting process can be forcibly stopped by the program method for any preset condition. To do this enter a conditional transfer operator in place of the FL0 type loop operator. Then the loop is organized with a multiple repetition of its body and with transfer of control to the address of the beginning of the loop if the conditional transfer entered is not fulfilled. For example, variable A is computed with an increase in its value. When its value approaches a certain given $A_{зад}$ it is necessary to exit the loop, observing the condition that absolute computation error $\varepsilon=A_{зад}-A$ must not exceed $\varepsilon_{зад}$. A diagram of the organization of a fragment of such a program is shown in Fig. 2.

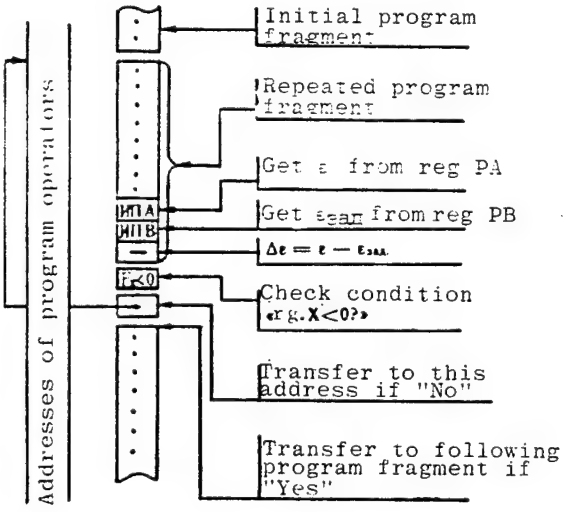

Fig. 2

It is apparent from the diagram that to organize the loop a variable must be computed in its body either with an increase or with a decrease in absolute value for each repetition step. At the end of the loop this value must be compared with its given (permissible) value. Difference from a given value (current error) ε, compared with a previously given error $\varepsilon_{зад}$, ensures necessary computation accuracy. If condition $|\varepsilon|<|\varepsilon_{зад}|$ is fulfilled, the loop is exited.

That organization of the loop is applicable in determining the desired value by the method of successive approximations. For example, minimum permissible flight speed for a given altitude must be determined when we know the relationship of the permissible lift coefficient to the flight Mach number [$C_{y\ доп}=f(M)$]. Since level-flight speed and the Mach number connected with it depend on $C_{y\ г.п}$, and minimum permissible speed (or $M_{мин.доп}$) depends on $C_{y\ доп}$, the task reduces to solving the equations $C_{y\ г.п}=1.43G/(p_H M^2 S)$ and $C_{y\ доп}=f(M)$ by the method of successive approximations. The relationship $C_{y\ доп}=f(M)$ approximated by the equation $C_{y\ доп}=A-BM$, where A=0.84 and B=0.2353, is shown in Fig. 3.

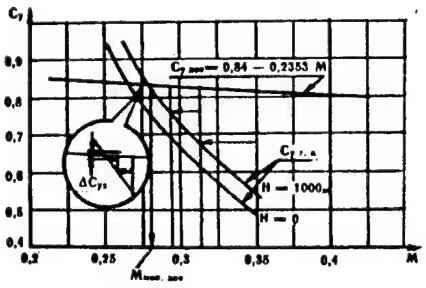

Fig. 3

To calculate $M_{г.п}$ as the initial number we take a number known to be greater than $M_{мин.доп}$, such as that corresponding to control speed $V_{эв}$=400 km/hr ($M_{мин.доп}$ =0.33). We determine $C_{y\ доп_i}$ and $C_{y\ г.п_i}$ for it, and then the difference $\Delta C_{y_i}=C_{y\ доп_i}-C_{y\ г.п_i}$ is compared with the given error ΔC_{y_ε} we have chosen. If the current value of ΔC_{y_i} is greater than ΔC_{y_ε}, we will determine the new value $C_{y\ г.п_{i+1}}=C_{y\ г.п_i}+\Delta C_{y_i}/2$, we will find a new flight Mach number and the $C_{y\ г.п_{i+1}}$ conforming to it, and will repeat the calculation. If the current value $\Delta C_{y_i}\leq C_{y_\varepsilon}$, then calculation stops and the Mach number found for the last value of $C_{y\ г.п}$ is taken as $M_{мин.доп}$.

The scheme of the algorithm for solving the problem is shown in Fig. 4, and the program for an MK-54 programmable microcalculator has the form:

```
00.ИП1 01.1 02.· 03.4 04.3 05.× 06. ИП2
07.÷ 08. ИП9 09.÷ 10. ПА 11.ИП8
12. FX² 13.÷ 14. ПС 15.ИП3 16.ИП4
17.ИП8 18.× 19.— 20.ИПС 21.— 22.ПД
23.2 24.÷ 25.П0 26.ИПС 27.+ 28.ПС
29.ИПА 30.↔ 31.÷ 32.F√ 33.П8 34.ИП0
35.ИП5 36.— 37.FX<0 38.15 39.ИП8
40.ИП7 41.× 42.3 43.· 44.6 45.× 46.С/П
47.БП 48.00.
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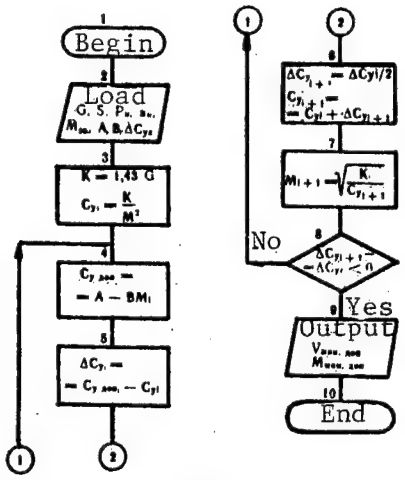

Fig. 4

The instructions for using the program are as follows:

1. F PRG, load program, F AVT. V/O.

2. Load registers: G (kg) into P1; S (m^2) into P2; A into P3; B into P4; ΔC_{y_ε} into P5; a_H (m/sec) into P7; $M_{ЭВ}$ into P8; ρ_H (kg/m^2) into P9; registers P0, PA, PB, PC, PD are operation registers.

3. S/P, result: $V_{мин.доп}$ into register X, $M_{мин.доп}$ into register P8.

4. Load new values of ρ_H and a_H (H) or G into registers P9, P7 and P1, load $M_{ЭВ}$ into register P8 and go to line 3.

Example. We will take coefficients A=0.84, B=0.2353 and given error $\Delta Cy_\varepsilon=5.10^{-4}$ in equation $C_{y\ доп}=A-BM$. Let G=14,500 kg, S=34 m^2, $M_{ЭВ}=0.33$. Then with $\rho_{H=0}=10332$ kg/m^2, $a_{H=0}=340.3$ m/sec result into register X: 338.15348, $V_{мин.доп}=338$ km/hr; into register P8: $2.7602563\cdot10^{-1}$, $M_{мин.доп}=0.276$; with $\rho_{H=1}=9165$ kg/m^2, $a_{H=1}=336.4$ m/sec result into register X: 355.9159, $V_{мин.доп}=356$ km/hr; into register P8: $2.9389277\cdot10^{-1}$, $M_{мин.доп}=0.294$.

Now let us look at an example of the loop computing process with a given number of repetitions. We will use operator FLO for this.

The requirement is to write a program for determining aircraft acceleration time Δt_p with control function $n_x=f(V)$.

It is known from flight dynamics that for level-flight conditions $\frac{dV}{dt}=gn_x$,

where n_x is the longitudinal load factor and g is the acceleration of gravity.

Then $t_n-t_0=\Delta t_p=\int_{v_0}^{v_n}\frac{1}{gn_x}dV$.

The equation is solved by the familiar method of areas. For this convert function $n_x=f(V)$ to function $\frac{1}{gn_x}=f(V)$ and construct it graphically, and determine area S limited by the function $\frac{1}{gn_x}$ and ordinates V_o and V_n.

The scheme of the algorithm for solving this problem is shown in Fig. 5. It takes into account that the entire range of speeds (from V_n to V_o) is broken into n equal sectors with a step of ΔV. Area S is determined from the mean value of the load factor n_{xcpi} in the step (block 7 of the algorithm). The increment of aircraft acceleration time Δt_{p_i} is determined in block 8, and summation is done in block 9.

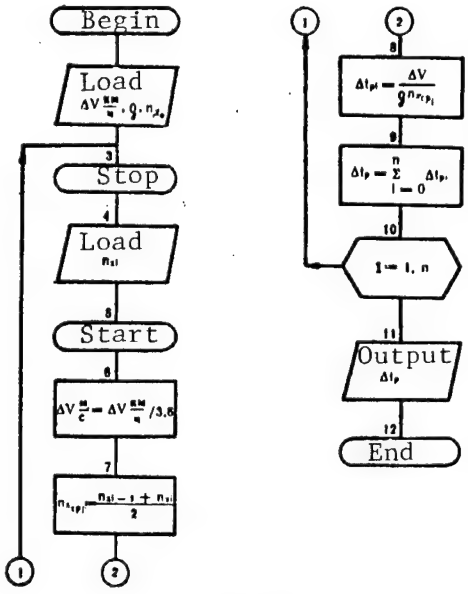

Fig. 5

Thus Δt_p is determined by multiple repetition of algorithm blocks 4-9. The loop in block 3 is interrupted for loading the next value of n_{x_i}.

The program which implements this algorithm has the appearance:

```
00.П0 01.0  02.П5 03.С/П 04.П3 05.ИП2
06.+  07.2  08.÷  09.9   10.·   11.8  12.1
13.×  14.ПА 15.ИП8 16.3  17.·   18.6
19.÷  20.ИПА 21.÷  22.ИП5 23.+  24.П5
25.ИП3 26.П2 27.FL0 28.03 29.ИП5 30. С/П.
```

Instructions:

1. F PRG, load program, F AVT, V/O.

2. Load registers: ΔV km/hr into P8; n_{x_o} into P2; result adder is register P5; loop counter is register P0; registers P3 and PA are operation registers.

3. Load number of loops "n" into register X, S/P, 0 on the indicator.

4. Load next value of nx_i into register X, S/P; nx_i, S/P; ...n_{x_n}, S/P.

Notes. 1. One program loop is counted after loading each new value n_x and pressing key "S/P."

2. Calculation result lights up on the display at the end of the n-th loop.

3. If it is necessary to check an intermediate result it should be called from the result adder--register P5. Calculation continues here by loading the next n_{x_i} into register X and starting the program: S/P.

As an example we will use the program cited for determining aircraft acceleration time from V_o=500 km/hr to V_n=950 km/hr with engine operating at maximum nonboosted power setting, where n_x=f(V) is given by the graph (Fig. 6).

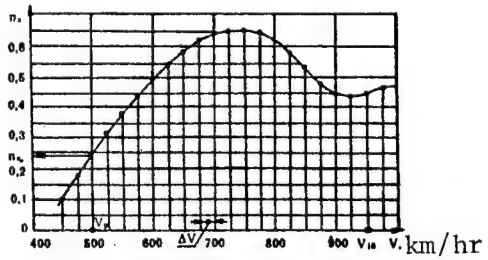

Fig. 6

We will take ΔV=25 km/hr, then n=18. We determine from the graph (Fig. 6) the initial value n_{x_o}=0.24. Then we load the number 25 (ΔV) into register P8, and the number 0.24 (n_{x_o}) into register P2. We transfer the program to the zero address B/O, punch in the number 18 and press the "S/P" key--0 on the display. These actions enter the number 18 into the loop counter, register P0. We load the values n_{x_1}=0.31, S/P; n_{x_2}=0.36, S/P; ...$n_{x_{18}}$=0.445, S/P and the result on the indicator is 25.997354.

And so aircraft acceleration time from V_0=500 km/hr to V_n=950 km/hr is ~26 seconds.

In advanced calculations some loop processes may be a part of other loop processes. We will look at this in an example. Let us assume that operator FL0 must repeat a program fragment 20 times, but it contains operator FL1 which fully repeats the execution of a certain portion of the program ten times. Thus loop FL1 is nested in loop FL0.

The programmable microcalculator permits nesting four loops independent of each other. In programming nested loops it should be borne in mind that all operators of the inner loop must be included in the body of the nearest encompassing loop.

The possibility of nesting loops is an effective means of programming by which it is possible to write many short, fast programs.

When compiling algorithms and writing programs of loop proceses one must correctly identify the group of operators to be repeated and determine the procedure for changing the loop. It is also important to carefully think through organization of the result output. In loop processes the solution can be put out both in the body of the loop (by steps) as well as after completion of the loops (files of stored results). In writing loop programs it is especially important to preclude "cycling" of the programmable microcalculator, i.e., an endless repetition of some fragment of the program. Such cases arise in practice with errors in writing operators and in formulating conditions for the ends of a loop (instructions on transfer addresses), and when initial data are incorrectly given.

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DIFFERENT DEVELOPMENT OF YOUNG OFFICERS DESCRIBED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 3, Mar 87 (signed to press 2 Feb 87) pp 38-39

[Article by Col V. Ivanov under rubric "On Topics of Morality": "In Line of Duty"]

[Text] The porous snow in the field beyond the airfield showed gray and from time to time was powdered by a ground wind, but the approach of spring could be felt acutely during a lull. The odor of thawing chernozem drifted in. Starlings were supposed to arrive at any time. Lt Aleksey Vasin loved this time of year. His first spring as an officer was approaching.

Heading for the obato [separate airfield maintenance battalion] headquarters, Aleksey recalled how he had begun his service. Frankly speaking, he was suited by the position of platoon commander in the motor transport equipment company. He liked everything there: the subunit commander's strictness and thoughtfulness, his subordinates' high level of special training, and the strenuous work at the airfield, where it was often necessary to support the regiment's flights in a difficult atmosphere and pass tough tests for combat maturity.

In time Aleksey mastered his official duties. There was only one he couldn't get accustomed to--the whine of the siren when officers dashed headlong to their combat posts at the "Assemble" signal.

Once in chatting with the company commander Aleksey told him about this. The captain heard him out and after pondering a bit said:

"That feeling is explainable. The 'Assemble' signal is an alarming and unexpected signal. Our nervous system apparently is so designed that we can never become accustomed to alarms."

Well, so be it. Vasin hadn't planned on becoming accustomed to it. In such anxious minutes he often recalled his father and the latter's restless service as a highway foreman. His father often was aroused from his bed after midnight by persistent telephone calls. Nikita Danilovich would go to the phone half-awake and wearily breathe into it:

"Fine... I'm coming."

And after hastily dressing he would depart for where his help was needed in those minutes. And his mother, stealing a glance at the clock, would say in a dissatisfied tone:

"Oh, this obsession and what it doesn't do to people. I dare say others don't bend over backwards. They work and rest quietly, but here..."

Once Aleksey began speaking with his father on this subject. His father carefully listened to his son, then responded:

"Here is my behest to you, Aleksey, before you go into the Army. Bear out my hope. Be friends only with good work."

Much water had gone under the bridge since then, as the saying goes. After service as a private Aleksey successfully completed higher military aviation engineering school. Lieutenant shoulderboards were placed on his shoulders and together with them a great responsibility for performance of official duty and for the platoon's combat readiness.

Vasin recalled how the company commander had introduced him to the personnel. A little embarrassed at that time, Aleksey looked closely into the faces of the privates and NCO's. He looked at his subordinates and thought about where to begin so that each of them could say to a comrade after a certain time: "That is what the commander ordered."

That evening he unexpectedly met Sr Lt Sergey Krupenin.

"Greetings, schoolmate!" Krupenin greeted him. "Of course you may not remember upperclassmen, but your face is very familiar to me. In short, I am inviting you to permanent residence with me. The room I rent is in order, you won't regret it. Well then, we've decided the question of housing. What is due from you is..."

"I don't have a fancy for alcohol," responded Aleksey dryly.

"You don't wish to celebrate the meeting and housewarming?" asked Krupenin in surprise. "This is an age-old custom. It isn't for us to rescind or breach it."

They celebrated the housewarming. True, despite all persuasion, Aleksey didn't touch the vodka. On the other hand Sergey didn't hold back. On becoming drunk, he began to boast how well he and his subordinates supported flights, and he didn't forget to emphasize that Vasin would not reach such heights that quickly. In the morning Krupenin didn't go to work, complaining of a stomach-ache.

Aleksey tried to muffle the unpleasant aftertaste left in him from the first meeting with his schoolmate. He persuaded himself that one couldn't form an opinion about a person, especially a young person, that way, with a rush. One had to be more patient toward someone else's deficiencies. "Judge not, that ye be not judged?" grinned Vasin. "A flimsy philosophy. All right, we'll see what happens..."

It can't be said that they lived in great harmony under the same roof, but they didn't quarrel. They prepared for activities together. They often argued about methods of indoctrination and the role of psychological preparation of personnel for combat work. They didn't always come to a common opinion because often Krupenin, warmed up with alcohol, carried on polemics in an unseemly tone and an excessively nervous manner. Then it was no longer a question of searching for the truth. Their relationship was becoming more and more strained.

Later the young officers parted without having become real friends. Aleksey soon got married and the first nonalcoholic Komsomol wedding was celebrated in the garrison. Krupenin didn't come to the celebration, but on the following day, Sunday, he appeared in his cups. He reproached Aleksey for the absence of male solidarity and upbraided him for some kind of "nonmale" character. It was unpleasant to listen to all this and Vasin barely held himself in check.

The chill of alienation between the schoolmates strengthened. On duty they would forget about their differences, they would share knowledge and experience and would carry on professional arguments. Later they would part: Aleksey to hurry home and Sergey to set off more and more often for the rayon center, from which he often returned intoxicated on the last bus or sometimes by hitching a ride. In this time he managed to receive several punishments from the command authority.

Love also came to Krupenin against all expectations. The senior lieutenant fell in love with a medical school student. They married, but the change in life did not reflect in any way on his attitude toward duty. He seemingly forced himself to do everything as if he couldn't in any way overcome an invisible barrier. After some time Aleksey was transferred to another subunit and the schoolmates began to see each other even more rarely.

Nevertheless, despite everything, Krupenin mattered to Aleksey. Aleksey pitied him, for he was a capable, knowledgeable officer. It was only that he hadn't yet found the pivot, hadn't discovered the fulcrum. No good could be expected of the drinking bouts.

"But what concern is it of yours in this respect?" Aleksey often would ask, checking himself. "You are a platoon commander just like Krupenin. He has his own commander. Let him indoctrinate Krupenin." "No, it can't be so unceremonious," he would object to himself in the next minute. "If there is just some opportunity to drop a good seed in a person's heart, one has to use it without fail. The fact is that Sergey isn't your enemy. He must understand what's what. I have to have a talk with him."

The conversation was a long time coming. The strenuous flights, tactical flying exercises and airfield concerns left no free time. Nevertheless he met with Krupenin in a relatively quiet atmosphere.

They talked until late at night. Aleksey was pleasantly surprised by the changes which had taken place in his comrade. Where had the haughty notes gone with which Sergey at one time had lectured his schoolmate, expanding on his right to spend his leisure time as he liked? Krupenin's voice also didn't

contain the previous accentuated indifference when he was telling about affairs in the platoon and about his subordinates. One sensed that now people in the collective had opened the senior lieutenant's eyes to a great deal and forced him to reinterpret some things. Nevertheless, thought Vasin to himself, it was probably a little early to draw a final conclusion.

"What are your plans, if it is no secret?" inquired Aleksey.

"There are some prospects," answered Sergey evasively. "By the way, you no longer will have to reproach me. I don't drink..."

"That's great, Sergey!"

Several months later Lt Vasin was summoned by the separate airfield maintenance battalion commander, who said:

"Capt Kulyupin, the 2d Company commander, has been given a higher assignment. We weighed everything here and decided to appoint you to the vacated position."

This decision was unexpected for Aleksey. "Sergey's commander in place of the previous company commander?" he thought, dumbfounded. "Wow!" And a minute later he firmly uttered:

"Thank you for the trust. I will try to justify it."

"Comrade Lieutenant, permit me to learn the purpose of your visit. Acting Subunit Commander Sr Lt Krupenin."

Sergey uttered the final words now in a serious manner and not without a certain pride. Vasin decided not to hasten events at that moment and responded with restraint:

"Yes, well, I have come in line of duty."

An hour later at formation the battalion commander officially introduced the new commander to the personnel. Sr Lt Krupenin received this news calmly. That evening on the way to the military post he said to Aleksey:

"I'm glad for you. And I... Do you think I am offended? No, and no again. It is correctly said that each person himself forges his own destiny, and the military career, by the way, as well. One can't immediately get rid of a bad reputation."

The days flew by, one seeming shorter than the other. There were airfield rear services exercises and support to flight sections, crosscountry flights and LTU [tactical flying exercises]. New replacements came into the subunit, many servicemen directly from the schoolbench, and the age-old question arose: how to get those who just yesterday didn't have a sufficient impression of the features of operating and maintaining sophisticated military equipment in the company inventory into formation as quickly as possible? Vasin consulted with platoon commanders and NCO's about this.

First Platoon Commander Sr Lt Krupenin rose. He told about the rational use of progressive methodology and volunteered to organize competition among the young servicemen. Then together they selected leaders from among the most experienced specialists.

The young people gradually mastered what was for them a new profession step by step. Soon the novices learned to service special equipment promptly and competently, read its characteristics, assess the operating quality of machine units and skillfully maintain and preserve them. Everyone trained rather often in means of protection against mass destruction weapons.

The knowledge not only of young specialists but also of their mentors grew. Vasin came to believe in the strength of his assistants. More than once he conducted activities together with Krupenin. The company commander advised some, gave orders to others and strictly punished still others for miscalculations and for deviating from the requirements of instructions and manuals. From time to time Vasin organized an exchange of work experience on the combat equipment at the level of the entire company. Such equipment nights developed into interesting activities. Each serviceman tried to shine in professional erudition and in expertise of servicing vehicles and equipment. Equipment nights helped the company commander arouse a thirst for knowledge in subordinates and get them interested in effective rivalry and a contest in tasks and norms.

Soon the subunit received a high grade in a routine inspection. Company privates, NCO's, warrant officers and officers did everything to become competition winners.

"For now we have only taken the first step," said Vasin, addressing his subordinates at a summation of results. "It is necessary for our outstanding company to become a subunit of outstanding personnel by the end of winter training."

When everyone had left Krupenin said thoughtfully to Vasin:

"You remember that time in the barracks you said: 'I have come in line of duty'? That is engraved in my memory. Line of duty. Words of deep meaning. I don't know how it is for others, but for me they will sound that way for many months more--as duty. This duty has to be rendered sooner or later, but it is better to do this from the first steps as an officer. I know this from my own bitter experience."

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REFERENCE POINTS IN FLIGHT TRAINING

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 3, Mar 87 (signed to press 2 Feb 87) p 40

[Article by Col A. Plotnikov, 1st Class military pilot, and Maj (Res) A. Safronov under rubric "From the Life of Military Educational Institutions": "What is a Reference Point?"]

[Text] Flight schools presently are using a methodology of teaching cadets flying according to so-called reference points (OT). Experience indicates that the quality of the flying technique and flight safety substantially improve from its adoption. Flight instruction personnel, however, are experiencing difficulties chiefly from the fact that there is no uniform understanding of the methodology's essence and no precise definition of the reference points themselves. For example, in the article entitled "By the Reference Point Method" (AVIATSIYA I KOSMONAVTIKA, Nos 6, 7, 1983) a reference point was said to be a limited spatial area on a given flight path in which there are characteristic changes occurring in dominant parameters under a specific program. The training methodology, however, is based on the fact that the reference point reflects a steady state with preset parameters and not a change in the parameters. Thus the very definition of a reference point does not indicate its actual position on the aircraft movement path and as a result does not reflect its purpose.

In some training aids developed by the methods departments of flight schools the reference point is the objective for which the cadet must strive in successive execution of a figure's elements. Such a definition also contains an inaccuracy. For example, if in the course of making a flight we set an objective connected with monitoring the protracted maintenance of a steady state or perform some action essentially not connected with flying techniques, then a choice of the number of reference points is possible with such a definition. But for the cadet there is one objective--to perform the flying assignment. The number of reference points depends on the laws of flight dynamics. This means the reference point should be taken to mean a spot on the aircraft movement path in which a change of leading parameters begins or ends. For a 360° banked turn, for example, such parameters can be the bank and load factor; for the chandelle they can be the bank, pitching and load factor; and for the normal loop it is the load factor.

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ОПОРНАЯ ТОЧКА. ЧТО ЭТО ТАКОЕ?

См. статью в этом номере журнала.

To better understand the essence of a reference point let us examine the chandelle in its classic execution. The initiation of a climb angle and accordingly of a load factor (a change in leading parameters) will be the place of the first reference point. Attainment of a given climb angle and the initiation of a bank is the second reference point. Attainment of a given bank, pitch angle and load factor is connected with the constancy of these parameters. This place on the path will be the third reference point. The beginning of a decrease in bank, pitch angle and load factor corresponds to the fourth reference point. Hence it follows that the number of reference points on a flight path is not determined by the objectives, but actions aimed at establishing parameters inherent to the next reference point are the means of attaining an intermediate objective. There will be as many such objectives as reference points and so the basic purpose of the reference point is so that the cadet shifts his attention relative to them strictly according to place and time. In establishing a given aircraft attitude in space he uses noninstrumental information (the attitude of visible parts of the aircraft relative to space outside the cockpit, a change in forces on the aircraft control stick, the sensation of an overload factor and so on) and when he achieves the next reference point he uses instrument readings.

An algorithm for executing each flying figure must be developed in the course of preparing for flights. The order of actions, use of noninstrumental information in flying, and monitoring of flight parameters from instrument readings at reference points must be determined here. For example, the first reference point of a chandelle characterizes level flight at a given speed. Therefore at that point it is necessary only to monitor translational and vertical velocity from instruments (absence of a bank is easily checked from the perception of space outside the cockpit). Creation of a climb angle is checked from the sensation of forces on the control stick and from the aircraft's shift relative to the natural horizon. Inasmuch as only one leading parameter, pitch, changes here, it is monitored from the AGD [remote gyrohorizon] (the second reference point). The approach to the third reference point at a given bank, angular rotation, overload factor and angle of trajectory inclination is checked with the help of a set of noninstrumental information (perception of the aircraft attitude relative to space outside the cockpit based on bank, angle of trajectory inclination, rate of angular rotation, as well as forces on the control stick, sensation of the overload and a change in the sound background). The third reference point characterizes the beginning of the spiral leg of the chandelle. Its signs are bank, pitch and overload factor, and so at the third reference point bank and pitch are checked from the remote gyrohorizon and overload from the accelerometer. A correction must be provided on detecting a deviation.

The regime of the spiral leg of the chandelle is maintained based on noninstrumental information. At the fourth reference point the character and rate of movement of controls in taking the aircraft into flight toward a selected reference point (flight heading) are predicted based on leading flight parameter values. At the fifth reference point monitoring is necessary not only to evaluate the quality of executing the chandelle (flight direction, speed and present altitude), but also to check readiness for further execution of the assignment. Thus the last reference point of the figure often is the first reference point of next maneuver. That regulation of attention

allocation helps actively form a flying sense, i.e., an ability to fly with maximum use of noninstrumental information.

The reference point locations are at the boundaries of the figure's stages as it were. At those points the cadet compares his perception of spatial attitude with instrument readings. Parameters are adjusted in those cases where there is a sharp deviation from given values. For example, if a deviation in bank and pitch is noted at the third reference point of the chandelle, it is necessary to make corrections, otherwise the spiral leg of the turn will not support the aircraft's arrival at the fourth reference point with given parameters. At the fourth point correction is no longer advisable; here it is necessary to forecast actions ensuring the aircraft's positioning based on existing parameter values.

What should be done when it is necessary to monitor instrument readings in passing between reference points? To this end the locations of so-called control points (KT) are determined at which one or two instrument readings are checked. In contrast to a reference point, the control point is located where no changes of leading parameters occur, but where difficulties arise in evaluating the aircraft's attitude and movement in space from noninstrumental information. For example, on the descending leg of the roll at the point where a 50° dive angle is attained it is advisable to have a control point at which the standard velocity value is compared with instrument readings and the rate of the aircraft's positioning in horizontal flight is determined.

If as already stated the reference point locations are dictated by the laws of flight dynamics, control point locations are determined by the level of flying technique at a certain stage of training. They are of a temporary nature, they reflect a cadet's degree of training above all, and so their number and position can change.

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MARKOV BOOK ON PEOPLE BEHIND INTERPLANETARY STATION DEVELOPMENT

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 3, Mar 87 (signed to press 2 Feb 87) p 41

[Review of book "Korabli ukhodyat k planetam" [Ships Depart for the Planets] by Yu. M. Markov, Mashinostroyeniye, Moscow, 1986, 176 pages, under "New Books" rubric: "Into Far-Off Space..."]

[Text] Everyone following the development of Soviet cosmonautics will read this new book with interest. It shows the selfless labor of many collectives which are creating, testing and launching automatic interplanetary stations such as Luna, Venera, Mars... The reader mentally visits the plant, the Baykonur Airfield space port, the design bureau, a session of the Council of Chief Designers, and the Long-Range Space Communications Center. He or she will feel the atmosphere of creativeness, anxieties, excitements and searches characterizing the period of assault on outer space.

The book's author is a spacecraft test engineer, an immediate participant of the events. He managed to pass on in a lively and entertaining way the coloration of events which now have become history connected with the preparation, tests and launches of automatic interplanetary stations. He tells about meetings with S. P. Korolev, M. V. Keldysh and G. N. Babakin. All were distinguished by broad erudition, resolve and boldness and they weren't afraid to assume responsibility.

Many warm words are said about system chief designers, their deputies, project technical directors, designers, operators and testers. At the same time, the author also devotes no less attention to young specialists.

Spacecraft of the Land of Soviets will depart again and again for distant space. The peaceful essence of space presumes its peaceful development. There must be no alternatives here.

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HISTORY OF INTERKOSMOS SPACE RESEARCH PROGRAM DETAILED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 3, Mar 87 (signed to press 2 Feb 87) pp 42-43

[First part of article by M. Rimsha under rubric "20th Anniversary of 'Interkosmos' Program": "Orbits of Cooperation"]

[Text] Space research, one of the youngest fields of human endeavor, today embodies the foremost milestones of scientific-technical progress.

The tasks of developing outer space have become so grandiose that more and more often they require a unification of efforts even of countries most developed in the S&T sense. This is why international cooperation is being transformed into one of the decisive factors for man's successful conquest of outer space.

In April of this year ten socialist countries will mark the anniversary of their joint activities--the 20th anniversary of the Interkosmos program. Twenty years of joint labor, common joys and anxieties, difficulties and achievements...

On the eve of the jubilee let us recall the events and people who played a prominent role in the establishment and development of the program for space cooperation of fraternal countries. We will stipulate right off that we will not give a scientific classification of the job done within the framework of Interkosmos or assess its results. We see our task only in following the principal stages of cooperation with specific facts and brief commentary which can be subjective and lay no claim to thorough scientific analysis.

The basis of the cooperation was the rapid development of the Soviet space research program. As early as 1957 the observatories of some scientific organizations of Bulgaria, Hungary, the GDR, Poland and Czechoslovakia joined in ground observations of the flight of the first manmade Earth satellite.

Our country's unfolding research in space more and more actively affected the work of scientists of fraternal countries. By 1966 the scientific-technical potentials of socialist countries permitted them to take an immediate part in space research and act as developers of scientific gear and as authors of scientific experiments. Objective preconditions thus appeared for creating and implementing a program of international space research through the efforts of countries of the socialist community.

On 14 April 1965 the Soviet government proposed to governments of socialist countries that the first consultations be held for organizing cooperation in space research. Positive responses were received from the People's Republic of Bulgaria, Hungarian People's Republic, the GDR, Mongolian People's Republic, Republic of Cuba, Polish People's Republic, Socialist Republic of Romania and the CSSR. In that same year and then in the following year experts of these countries met in Moscow to discuss organizational and scientific-technical aspects of future cooperation. Based on the comprehensive recommendations which were developed, a decision was made in April 1967 on organizing a program of joint space research and the basic principles and scientific-technical areas of joint projects were defined.

It must be noted that at that time the program had no name. The name Interkosmos appeared only in 1970. The program did not have its own official emblem for an even longer time. Different versions were proposed, but they did not take root. Finally an emblem with a stylized depiction of an obelisk in honor of the first manmade Earth satellite and the inscription "Interkosmos" began to be used by the mass media in the period of preparation of joint manned flights. It was the general opinion that this version was the most successful and in 1979 the emblem of cooperation received legal rights.

And so the Interkosmos program was launched in April 1967. Certain difficulties were encountered in that period. Some highly skilled scientific-technical cadres did not yet have sufficient experience in space research. It had to be acquired, and in the shortest possible time. Here the enthusiasts of the first years of cooperation had their weighty say. There were many of them and it is simply impossible to enumerate them in this short article.

Enthusiasm and comradely mutual help in the highest meaning of this word permitted preparing two sets of scientific equipment in two years. It is impossible not to recall the Soviet designers, and particularly V. Kovtunenko, presently a USSR Academy of Sciences corresponding member, who worked on the creation of the first Interkosmos series ISZ [satellites]. The first satellite went into space from the Kapustin Yar Cosmodrome on 14 October 1969 carrying scientific instruments weighing around 30 kg--not that much according to present-day measures. It didn't operate in space for long (the active life of the first Interkosmos satellites was figured at two months), but this was the first major achievement of the program marking the beginning of its grand path.

A very lively atmosphere reigned at the observation post of the launch pad on launch day. Everyone was excited: the cosmodrome proprietors; their guests, scientists and specialists of the GDR, USSR and CSSR who had prepared the experiment; and the leaders of national coordinating organs of the participating countries who had come here. The "hottest" place was at the fixed binoculars which permitted a better view of the white launch vehicle with "Interkosmos" in red letters. The observation post was a rather long distance, several kilometers, from the start. Therefore at first we caught sight of the reddish-purple glow at the base of the rocket and then its swift upward run.

There was one more launch two and a half months later on the eve of the New Year of 1970. Scientists and specialists of the People's Republic of Bulgaria, the GDR, USSR and CSSR were the authors of a scientific experiment aboard the Interkosmos-2 satellite.

The year 1970 was marked by the first flight of the Vertikal research rocket. This experiment later was given a logical continuation in the launches of another ten rockets of that class.

The Kapustin Yar Cosmodrome operates with a heavy workload. Regular launches of weather rockets, the equipment for which is created in cooperating countries, began there in 1971. Thus was born one more traditional kind of research under the Interkosmos program.

Representatives of governments of countries participating in the Interkosmos program signed an Agreement in Moscow on 15 November 1971 creating the Intersputnik International System for the Organization of Space Communications, the foundations of which were laid down in the program of cooperation in the form of scientific-technical and methods elaborations.

Scientific equipment aboard an Interkosmos satellite (launched from Baykonur) returned to Earth for the first time in 1972. In that same year a cosmodrome near Plesetsk Station, Arkhangelsk Oblast, joined in work under the Interkosmos program. This was a very important event: now the range of studies of areas of outer space near the Earth's poles broadened substantially. The housewarming at the cosmodrome was celebrated by the successful launch of the Interkosmos-8 satellite by scientists and specialists of the People's Republic of Bulgaria, GDR, USSR and CSSR.

Interkosmos celebrated the 500th anniversary of the birth of N. Copernicus by the launch on 19 April 1973 of the Interkosmos-Copernicus-500 jubilee satellite. It is fully natural that Polish specialists, countrymen of the great scientist, made a significant contribution to creating the scientific complex for this satellite.

Joint activities in the subject matter of medical-biological studies were gathering force. In 1974 scientists of socialist countries took part for the first time in analyzing results obtained from the Soviet Kosmos-690 biological satellite. Later there would be new experiments on the Kosmos-782, -936, -1129, -1514 and -1667 satellites. They not only enrich our basic knowledge in this area, but also permit constant work to improve conditions for cosmonauts' stay aboard the craft and stations during their space missions. A decision was made in December of that same year on creating a new direction in research within the framework of the Interkosmos program--remote sounding of the Earth with the help of aerospace resources.

The year 1976 was the beginning of a fundamentally new stage in development of cooperation. It was extraordinarily rich in events that were out of the ordinary and that had a significant influence on the quality and content of joint work.

The next satellite in the Interkosmos series bearing the number 15 went into orbit on 19 June. It differed substantially from its predecessors in design solution and increased S&T capabilities. The new spacecraft, which was given the conventional name "automatic universal orbital station" (AUOS), could take aboard five times more payload and its active life was trebled compared with old satellites. It is understandable that capabilities for performing experiments expanded and began to bear a comprehensive nature with the introduction of the automatic universal orbital stations to operation. The Unified Telemetric System underwent successful tests on Interkosmos-15. Now with its help scientists/experimenters of socialist countries can directly receive scientific data transmitted to Earth by their instruments. This substantially increased the efficiency of processing the data being received.

There was a meeting in Moscow in July of government delegations of countries participating in the Interkosmos program at which the Agreement on Cooperation in Research and Use of Outer Space for Peaceful Purposes was signed. This document officially embodied basic legal and organizational principles of cooperation. The Interkosmos program thus took a very important step in improving and developing its activities and all its aspects.

Three years later the program now had brought together ten countries: the Socialist Republic of Vietnam had acceded to the Agreement.

At that same 1976 Moscow meeting the Soviet delegation put forth a proposal to carry out a program of international manned flights aboard the Soviet Soyuz spacecraft and the Salyut-6 orbital station with the participation of citizens of countries included in the Interkosmos program. The proposal was greeted with a fervent response. Basic organizational and technical matters were discussed and agreed upon. Selection of cosmonaut candidates began in socialist countries in the fall of that same year, and the candidates subsequently underwent a complete course of training at the Cosmonaut Training Center imeni Yu. A. Gagarin. It was not just the future cosmonauts and their mentors who were working with purpose and inspiration, but also scientists and specialists of fraternal countries developing special research programs for all nine international flights.

The most important results of the first decade of cooperation probably lies in the fact that it occupied a prominent place in the activities of scientists of fraternal countries. Considerable experience was gained in joint research. Permanent international collectives of scientists and specialists working on specific kinds of research formed. The accomplishment of scientific tasks at the highest level became for them a matter fully within their capabilities. Necessary conditions were created for moving on to a qualitatively new phase of work under the Interkosmos program.

(To be continued)

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CHINA'S SPACE PROGRAM DESCRIBED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 3, Mar 87 (signed to press 2 Feb 87) pp 44-45

[Article based on foreign press materials by V. Sirotin under rubric "At the Readers' Request": "Cosmonautics in China"; first paragraph is introduction]

[Text] Comrades T. Samkharadze, O. Kirillov, A. Askarov and others asked us to tell about the space research program in China. We are fulfilling their request.

Lately officials and the Chinese press have begun to propagandize their space program more and more vigorously. They also have begun to invite foreign delegations to the country more often for familiarization with PRC achievements in space technology development. Moreover, China announced readiness to make available its CZ-2 (Great March-2) and CZ-3 (Great March-3) launch vehicles for placing foreign satellites in orbit on a commercial basis. As official PRC representatives declare, prices will be 10-15 percent lower than for a launch using the American Space Shuttle or the West European Ariane launch vehicle. It is also announced that China is ready to carry out technical cooperation and present a labor force for building launch pads on the territories of other countries and launching its own vehicles from them for orbiting satellites.

Foreign observers note that after last year's U.S. Challenger space shuttle disaster and the Titan-34D and Thor-Delta launch vehicle accidents, prospects expanded for commercial use of Chinese equipment. In addition to the financial profit from launching foreign satellites with its own vehicles, the PRC also hopes to obtain access to foremost technology of western countries.

At the present time requests for using Chinese launch vehicles have been submitted by Sweden (launching its own Mailstar satellite for "electroniic mail") and two American firms (for launching communications satellites). For example, in May of last year the American firm of Tersat and the Chinese Great Wall Corporation signed an agreement to the effect that the Westar VI satellite would be launched with the CZ-2 rocket in December 1987 and the Palapa B-2 in 1988. These satellites were not placed in the calculated orbits because of the accident of the space shuttle's interorbital tug during the tenth shuttle launch in February 1984 and they were returned to Earth during the 14th shuttle flight in November of that same year. As noted by Wu Keli,

head of the Chinese Great Wall Corporation, the question of using Chinese launch vehicles has been discussed with another 17 countries, particularly Iran, which plans to create a satellite communications system.

Today's successes of Chinese cosmonautics were laid down by the Soviet Union's selfless fraternal help in the late 1950's. It was then that China's scientific-industrial base began to be created and many thousands of specialists received education in the USSR.

The PRC is the fifth country (after the USSR, United States, France and Japan) to place a manmade Earth satellite in orbit with the help of a launch vehicle of its own manufacture. The first Chinese satellite, codenamed China-1 and weighing 173 kg, was launched 24 April 1970. Since then there have been 22 launches, five of which were aborted. These satellites were intended for studying PRC territory, weather observations, transmitting television programs, communications, and scientific research.

Remote sounding of the Earth from space has been defined as a state task of priority importance in the PRC. Photoreconnaissance satellites have been created within the framework of this program; their exposed film is returned to Earth in 1.5x1.8 m ejection containers. Around half of the 19 Chinese satellites placed in orbit to this date have been photoreconnaissance satellites. Photographs of small agricultural plots obtained from one such satellite had good resolution on the terrain, in the assessment of American specialists.

Another important direction of China's space program is the creation of a national satellite communications system. As PRC Academy of Space Technology Vice President Jiangdong Sun declared, at present only a third of the country's populace can view television broadcasts. Lately 53 ground stations of a satellite communications system have been built in the provinces and autonomous areas. It is planned to build over a thousand more in the next two years. A total of 30,000 receiving stations will be required according to estimates.

Placement of an experimental communications satellite codenamed STW-1 into stationary orbit on 8 April 1984 was the first practical step toward creating China's satellite communications system. The launch weight of the satellite was 930 kg, and the weight in stationary orbit after burnout of the "apogee" motor's fuel was 420 kg. A second communications satellite was launched in February of last year. Launch of the third Chinese communications satellite is planned for this year. It belongs to the new generation and uses more sophisticated electronics and an antenna with a narrow radiation pattern.

The PRC also has launched five scientific satellites. Three of them, launched on 20 September 1981 by one launch vehicle, were intended for astrophysical research.

The CZ-2 and CZ-3 launch vehicles now are used for launches in China. The CZ-2 rocket is a two-stage, liquid-fuel rocket capable of placing a 2 ton payload in a low circular orbit. The rocket launch weight is 191 tons, its length is 31.65 m and its diameter is 3.35 m.

The CZ-3 is the CZ-2 rocket with an additional third stage with a ZhRD [liquid-fuel rocket engine] using liquid hydrogen and oxygen. The third stage has a thrust of 4.5 tons. The rocket is capable of placing a payload weighing up to 1.4 tons in an elliptical orbit with an apogee of 36,000 km. The rocket's launch weight is 202 tons, its length is 43.25 m, the diameter of the first and second stages is 3.35 m and that of the third stage is 2.23 m. The first and second stage liquid-fuel rocket engines operate on asymmetric dimethylhydrazine and nitrogen tetroxide. The first launch of this rocket was on 29 January 1984, but the spacecraft was not placed into stationary orbit because of the failure of the liquid-fuel rocket engine. The second launch, as already noted, was on 8 April 1984 and was successful, allowing the first Chinese communications satellite to be placed in a stationary orbit.

A new CZ-4 (Great March-4) launch vehicle also is being created which is planned to be used to place a 2 ton payload in elliptical orbit. It is intended for launching the first Chinese weather satellite weighing 700 kg into a solar-synchronized circular orbit 800 km high this year.

Two cosmodromes have been built in China: Shuangchengzi and Xichang. The first is located in the Gobi Desert 1,500 km west of Beijing. Its construction began in the 1950's. The first Chinese satellite was launched from here. The cosmodrome has a launch position with service towers, an underground launch control bunker, a station for optically tracking the flight of rockets, and a tracking radar located approximately 70 km from the launch position. Control begins from the bunker 30 minutes before the launch; prior to this it is exercised from a center located 12 km from the pad in the city of Jiujuan.

The Xichang cosmodrome was built on mountainous terrain in southwestern China approximately 1,300 km south of Shuangchengzi. The more southerly location provides an energy gain in placing a payload in orbit. CZ-3 launch vehicles were used to launch three Chinese satellites (14th, 15th and 16th) from this cosmodrome. Xichang's resources permit launching rockets at an interval of 35 days, but only one or two CZ-3 rockets per year have been launched from it to date. It appears realistic to bring this number to 6-7 a year.

Three kilometers from the launch position is a monitoring and testing building and 5 km away is the cosmodrome facilities control center. The control center room uses Chinese produced computers in support of data processing.

To increase the payload delivered into stationary orbit by the CZ-3 launch vehicles, the PRC is attempting to create a new cosmodrome for launching these rockets which is closer to the Equator than the only launch pad being operated at the present time at Xichang. China proposed building an equatorial cosmodrome in Indonesia jointly with Singapore. Construction costs tentatively will be $800 million. The PRC apparently also intends to launch a direct television broadcasting satellite from this cosmodrome which could be used by countries of the Far East and Southeast Asia. In addition to this, the Chinese side took a positive attitude toward a proposal made to it in the middle of last year by representatives of an American firm about creating a joint space center on the Hawaiian Archipelago for preparing and launching American civilian space objects using Chinese launch vehicles.

The functions of controlling Chinese satellites are exercised by the flight control center in the city of Weinan. It coordinates the work of eight ground and four shipboard satellite tracking points.

Among China's scientific-production enterprises engaged in the development and creation of space equipment we should mention the Radiotechnical Institute, the Institute for Study of Problems of Environmental Effects, Institute of Control Equipment, as well as a machinebuilding plant near Shanghai intended for assembling the CZ-2 and CZ-3 rockets and a machinebuilding plant in Beijing which produces hydrogen-oxygen liquid-fuel rocket engines.

A delegation of American specialists which visited the PRC assessed this country's successes in developing space rocket technology rather highly. China managed to create two powerful launch vehicles, develop photoreconnaissance satellites and on-board equipment for remote studies, and place the first communications satellite into stationary orbit. Creation of the hydrogen-oxygen third stage of the CZ-3 launch vehicle was a great achievement. The country possesses technical capabilities for manned space flight.

In its foreign policy line China favors using outer space for peaceful purposes and preventing the spread of the arms race into space. In December 1983, for example, the PRC acceded to the 1967 Treaty on Principles Governing the Activities of States in the [Exploration and] Use of Outer Space, Including the Moon and Other Celestial Bodies.

At the 38th UN General Assembly Session China supported the Soviet draft Treaty Prohibiting the Use of Force in Outer Space and from Space Against Earth, as well as recommendations of the 2d UN Conference on Outer Space held in Vienna in 1982.

All this provides a basis to assume that the PRC will make a worthy contribution to the peaceful development and use of outer space on the basis of broad international cooperation.

Relations between our countries have improved noticeably in recent years. Speaking in July of last year in Vladivostok, CPSU Central Committee General Secretary Comrade M. S. Gorbachev noted that as far as can be judged, China and the USSR have similar priorities--an acceleration of social-economic development. Why not support each other? Why not cooperate in implementing our plans where this obviously will be to the benefit of both countries? The better relations are, the more we will be able to exchange experience, and this will permit our peoples to understand each other better.

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REVIEW OF BOOK ON SDI

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 3, Mar 87 (signed to press 2 Feb 87) pp 46-47

[Review by Capt I. Kuznetsov of book "Kosmicheskoye oruzhiye: dilemma bezopasnosti" [Space Arms: A Dilemma of Security] edited by Ye. P. Velikhov, R. Z. Sagdeyev and A. A. Kokoshin, Mir, Moscow, 1986, 182 pages, illustrated, under rubric "To Assist the Propagandist": "What the SDI Brings"]

[Text] The U.S. State Department once calculated that existing nuclear arms were sufficient to arrange 2,400 wars such as World War II.

The importance the whole world attached to the meeting by heads of the two countries at Reykjavik on questions of curbing the arms race and reducing both sides' nuclear arsenals therefore is not surprising. Its result is well known: the most impressive agreements outlined for reducing nuclear opposition were nullified by the American administration's lack of desire to part with its Strategic Defense Initiative program.

Advertising spots periodically broadcast on American television indicate that everything is rather simple with SDI: Soviet missiles being launched are destroyed one after the other by American PRO [ABM defense] means. Life goes on and it is excellent. Americans are called upon to believe the impenetrability of the "space shield." Creating it only requires taxpayers to open their pocketbooks wider.

But in fact just what does the SDI bring to peoples? What are the scientific-technical, military-strategic and international-political consequences of the prospects for creating a wide-scale ABM system with space-based elements? The answers to these questions can be found in a recently published book.

Although some means of destruction being realized in the SDI program (laser, kinetic and beam weapons) may satisfy requirements of a hypothetical ABM defense system in the future, this does not mean a solution to the problem as a whole. The book covers in detail the difficulties and complexities of tasks which SDI creators are encountering. Here are some of them.

Leadership of the SDI program places the requirement of accidentfree functioning for ten years on the combat space station which will accommodate

weapons of the space echelon of an ABM defense. It is pointed out that during this time the station must retain total combat readiness not only without performance of repairs, but also without periodic technical servicing. From an economic standpoint these technical reliability requirements are inexpedient for the ground station, where it is much simpler on the whole to perform repair and periodic technical servicing; therefore as a rule such requirements are not presented. Thus as of today there is essentially no experience in creating technical systems with such high reliability and the task posed by program leaders appears technically problematical.

The question of a power supply for the ABM defense system's resources has not been resolved. Even in a waiting mode the combat station's electrical energy consumption can reach several hundred kilowatts depending on the type of equipment installed in it; this exceeds the output of modern space power plants by many tens of times. In the combat readiness mode, however, the station's electrical requirement will increase to several megawatts. Thus keeping the station in a "dormant" state in a minimum power consumption mode, the book indicates, presents a technical imperative for today as well as for the foreseeable future inasmuch as creation of powerful energy sources capable of supporting energy consumption of a station in an increased combat readiness mode for a lengthy time (measured in years) is an exceptionally complicated technical problem.

The problem of creating a precision system for detection, identification and guidance capable of successfully operating over requisite distances has been far from fully resolved. By 1990 it is planned to obtain a system for operations of detection, identification and prioritization of ten targets in real or near real time. The realistic number of targets on which such operations must be performed, however, should be considered as tens of thousands. This task will require a search for fundamentally new approaches and its solution is problematical with the contemporary technological base, to put it mildly.

One of the principal technical complexities in the path of implementing SDI is creation of a reliable control system capable of objectively assessing failures in its own equipment and along with it a computer system satisfying the entire ABM space defense structure. Calculations show that this will require writing a program of ten billion lines inconceivable of implementation. The book's authors note that development of new computer equipment necessary for accomplishing this task is being put off for an indeterminate period in view of the fundamental nature of the problem.

American literature repeatedly has emphasized that the ABM defense combat control subsystem must be an experimental system of artificial intelligence on a grandiose scale containing expert knowledge and assessments of the military-political situation and its possible development paths. But studies aimed at creating expert systems of this nature have just begun to unfold and their effectiveness generally is not subject to analysis. A wide-scale ABM system with space-based elements cannot be tested under real conditions and consequently there will be a considerable uncertainty in assessments of combat capabilities of the means being deployed.

To this should be added that in contrast to the Manhattan Project (creation of the atomic bomb) or Apollo, in the case of SDI it will be necessary to deal not only with the laws of nature, but also with an enemy who can effectively use these laws against the creators of a defense system.

Just what are the possible countermeasures on the Soviet side? It can use both active and passive means. Which ones will become clear as new armament appears.

The simplest countermeasure in response to the deployment of an ABM system, for example, can be a quantitative build-up in the arsenal of strategic offensive arms, i.e., in the number of targets to be intercepted and destroyed by the ABM defense system. We will note that appropriate means of intercept have not been proposed as yet for a portion of them. These are the ballistic missiles launched from submarines on flat trajectories, cruise missiles with different kinds of basing, and strategic bombers.

Possible countermeasures also include a change in the technology of launching missiles, such as by shortening the length of the powered flight phase or having it take place in the atmosphere, and increasing the number of warheads and decoys.

By the way, it is hardly necessary to continue enumerating the Soviet side's possible countermeasures to U.S. deployment of an ABM space defense system. The facts cited are quite sufficient to realize that it is impossible to create an impenetrable "space shield." I will recall alsod the rather simple calculations of Senator E. Kennedy, who said: "If the United States could create an ABM defense system 95 percent effective and the other side undertakes a strike against the United States in which 5,000 missile warheads will be launched, then 250 warheads will penetrate our defense, make their way to our populace and easily destroy the entire nation."

It is worthwhile directing attention to certain military and political aspects of creating space weapons. This must be done in connection with the fact that in appealing to the psychologically natural desire to finally find a defense against the all-destructive devastating force of modern nuclear weapons, defenders of the SDI exploit that desire unrestrainedly.

If we take account of the capabilities of ABM space defense weapons for destroying early warning and communications satellites it will become obvious that the side which has created and deployed a wide-scale ABM system with space-based elements also can obtain an effective means for delivering preemptive "blinding" strikes simultaneously against all components of the command and control system. An analysis shows that SDI should be considered with full right not only an offensive system but, moreover, also an aggressive system. It is effective only when the country which possesses it delivers the strike first.

One danger of deploying such an ABM defense system is that it provokes the other side to build up opposing strategic forces and resources with all the consequences for international security stemming therefrom. The book emphasizes that the SDI threatens to destroy the existing international law

regime in the arms limitation area. It bears a direct threat to the ABM Treaty, which is the foundation of the entire arms limitation system. If SDI can be called an initiative, it is only in the sense of seeking ways and means of aggression. The ABM Treaty essentially will be eliminated as SDI is implemented.

SDI contradicts a number of multilateral agreements in addition to the permanent Soviet-American ABM Treaty. Work within the framework of the "star wars" program to create space weapons powered by the energy of a nuclear explosion threatens to strike down the 1963 treaty banning nuclear weapon tests in three media, including outer space, the 1967 Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, and others.

The above permits stating with full right that if it is possible to call the SDI an "insurance policy," then it is not at all for America, but only for the bosses of the military-industrial complex for whom its implementation promises unprecedented profits.

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REVIEW OF BOOK ON FLEXIBLY LINKED SPACE OBJECTS

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[Review of book "Dinamika poleta sistem gibko svyazannykh kosmicheskikh obyektov" [Flight Dynamics of Flexibly Connected Space Object Systems" by V. A. Ivanov and Yu. S. Sitarskiy, Mashinostroyeniye, Moscow, 1986, 248 pages, illustrated, under "New Books" rubric: "Cable Systems"]

[Text] Articles and monographs devoted to problems of building and using space objects in near-Earth orbits which are connected by flexible communications have been appearing more and more often in scientific literature in recent years. What has caused scientists' interest in this problem?

In addition to the ordinary well-known forces acting on a satellite, one other exists in the case of using flexible communications--the reaction force of the stretched cable. It turns out that the choice of characteristics of space objects, initial conditions of movement, and the length and tensile stress of the cable provides a wide spectrum of practically realizable trajectories differing from classic ones dictated by the action of ordinary forces. This makes it possible to use space means more effectively for solving many problems. This is related in a new book published in izdatelstvo Mashinostroyeniye.

The idea of creating and using space objects connected by a flexible cable was expressed by K. E. Tsiolkovskiy. It saw further development in the 1960's, when space technology began to be used for accomplishing specific tasks. The principle of using two connected space objects presumes a successive deployment of the bundle, its stabilization in a working position, and roll-up to the initial state on completion of functioning.

The practical use of such arrangements is linked most often with problems of studying near-Earth space. A craft released on a cable up to heights of 100-150 km can increase the duration of sounding the upper atmosphere by an order of magnitude of two. It is well known that at such altitudes the period of a satellite's ballistic life is several hours and the flight of a weather rocket is counted in minutes. This layer of space near Earth is interesting for the fact that in it the lower neutral atmosphere interacts with space plasma. What does this proximity give us? The question has not yet been

completely studied, but it is known that winds and eddies originate in this layer and that it represents an important part of atmospheric global electrical circulation.

No less interesting are questions of obtaining electrical energy, creating a system of space radio communications, and delivering cargo in space with the help of a cable. In telling about this the authors perform an analysis of bundle movement with consideration of atmospheric resistance and the weight of the connecting cable and show the possibility of realizing stationary regimes of movement of connected objects which provide for a solution to the problems examined.

At the same time the book devotes much attention to questions of fulfilling dynamic operations. The authors cite examples of interorbital and local maneuvers of spacecraft and even release of a payload using the very same cable.

The action principle of the connector's reaction is based on the fact that the bundle's center of mass coincides with a point making a free orbital flight. Then if one of the craft descends in deploying, the other one must climb without fail in order not to disturb the free flight motion.

Interorbital maneuvers can be performed both by the continuous effect of the coupling reaction as well as with the bundle's uncoupling with a transition of the spacecraft into free flight. One such instance provides a movement path with the released craft landing on Earth. Local maneuvers are examined without disturbance of the coupling.

The book's authors cite a vast bibliography, make an attempt to show methods and results of a study of the flight dynamics of connected objects based on a generalization of previously performed work and their own work, and examine various questions of their practical application.

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